APPENDIX 21-A
ARCHAEOLOGICAL IMPACT ASSESSMENT, FINAL REPORT – HERITAGE INSPECTION PERMIT 2008-0128

Seabridge Gold Inc.

KSM PROJECT
Archaeological Impact Assessment, Final Report - *Heritage Inspection Permit 2008-0128*

SEABRIDGE GOLD

Public Version

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April 2012

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PUBLIC VERSION

April 2012
Project #0868-007-17

Citation:

Seip, L., S. McKnight, D. Walker, M. Campbell, and K. Farquharson. 2012. *KSM Project: Archaeological Impact Assessment, Final Report - Heritage Inspection Permit 2008-0128*. Prepared for Seabridge Gold Inc. by Rescan Environmental Services Ltd.: Vancouver, British Columbia.

Prepared for:

SEABRIDGE GOLD

Seabridge Gold Inc.

Prepared by:

Rescan™ Environmental Services Ltd.
Vancouver, British Columbia

Executive Summary

Rescan Environmental Services Ltd. was retained by Seabridge Gold Inc. (Seabridge) to conduct an Archaeological Impact Assessment (AIA) for the proposed KSM Project. This report presents the final results of the AIA.

Seabridge's proposed Project would include an open pit and underground mine, associated mining facilities, ancillary buildings, transmission lines, access roads, construction camps, and fish habitat compensation areas. The Project is located in northwestern British Columbia approximately 65 km north of Stewart along sections of Teigen, Sulphurets, and Treaty creek valleys and the Unuk River valley.

The assessment was conducted in accordance with the British Columbia *Heritage Conservation Act* (HCA; 1996) Heritage Inspection Permit No. 2008-0128, issued by the Archaeology Branch of the British Columbia Ministry of Forests, Lands and Natural Resource Operations (Archaeology Branch). The primary objective of this AIA was to identify and evaluate archaeological sites located within and adjacent to the footprint of the proposed Project development.[1] During the AIA, 5,931 shovel tests were conducted at 348 locations. The AIA recorded 20 new archaeological sites; there are 14 previously recorded sites in the Project area. Historic and recent land use features (primarily related to twentieth century prospecting and mineral exploration) were also recorded during the AIA; however, as these features post-date 1846, they are not protected by the HCA.

Site-specific management recommendations are presented below. In general, avoidance of archaeological sites is the preferred management recommendation. To ensure avoidance is achieved, Project staff should be educated about this requirement and sites should be marked as a "No Work Zone" on Project construction maps. Where avoidance is not possible, an application for a Section 12 Site Alteration Permit must be submitted to the Archaeology Branch prior to any alteration of a site. Additional mitigation measures (e.g., systematic data recovery and/or monitoring) may also be required and would be determined in consultation with the Archaeology Branch.

Sites HcTj-1, HcTn-1, HcTp-1, HdTj-1, HdTk-2, HdTk-3, HdTm-5, HdTm-11, HdTo-1, HdTo-2, HdTo-3, HdTo-4, HdTo-5, HeTk-1, HeTk-2, HeTk-3, HfTm-2, and HfTm-3

No effects are anticipated for these sites as they are located outside of proposed Project development. No further work is required. It is recommended that these site be marked as "No Work Zones" on development maps.

Sites HdTk-1, HdTl-1, HdTm-1, HdTm-2, HdTm-3, HdTm-4, HdTm-6, HdTm-8, HdTm-9, HdT-10, HeTl-1, and HeTl-2

These sites are located outside of the current Project footprint and are not at risk of direct effect from the Project. However, the Project would result in increased human presence in the general area, which could result in indirect effect to the sites. It is recommended that Project staff be educated on appropriate protocols for managing the known archaeological sites in the Project area and that the site areas be marked as "No Work Zones" on Project construction maps. If the Project footprint changes and approaches any of these sites, further work may be required.

[1] This AIA was not designed to address issues of traditional Aboriginal use and does not constitute a traditional use study. This report was written without prejudice to issues of Aboriginal rights and/or title. For more comprehensive information on recent, historic, and traditional land use in the Project area, the reader is directed to separate Project reports on traditional and ecological knowledge and use, as well as land and resource use.

Site HdTm-7

This site is within 50 m of the proposed Tunnel Spur Access Road, and while it is outside of the development footprint, it is at risk of disturbance during construction. Avoidance is the preferred management recommendation. This site should be indicated on development maps and clearly marked in the field as a "No Work Zone." If avoidance is not possible, mitigation measures are recommended. Mitigation would be determined in consultation with the Archaeology Branch and may include acquiring a Site Alteration Permit from the Archaeology Branch, systematic data recovery, construction monitoring, and/or capping.

Sites HdTn-1, HdTn-2, and HdTo-6

These sites are in direct overlap with the Project footprint, including the proposed Mitchell Pit (HdTn-1 and HdTn-2), and Construction Camp 3 (HdTo-6). Avoidance through Project redesign is the preferred management recommendation. If avoidance is not possible, mitigation measures, to be determined in consultation with the Archaeology Branch, are recommended. Mitigation may include systematic data recovery, construction monitoring, and/or capping. Any alteration to these sites would require a Section 12 Site Alteration Permit issued by the Archaeology Branch.

Snow/Ice Patches and Glacier Margins

The snow/ice patches and glacier margins in the Project area generally have archaeological potential. While no archaeological materials were observed in any of these areas, due to the potential for finds, it is recommended that archaeological monitoring be conducted in areas where the Project is in close proximity to or may impact snow/ice patches (such as in the Iron Cap area) or glacier margins (Mitchell Glacier and McTagg Creek).

General Project Recommendations

No further archaeological assessment is recommended for the assessed areas of the current proposed footprint. Any revisions to the currently proposed Project footprint should be reviewed by a qualified professional archaeologist, and an AIA should be conducted if necessary. Seabridge is advised that even the most thorough study may not identify all archaeological resources that may be present and an archaeological chance find procedure should be implemented prior to the commencement of ground altering activities. All Project staff should be made familiar with the procedure and protocols for managing the known archaeological sites and any "chance finds" that may occur during construction.

Please note that the management options and recommendations presented above are offered by Rescan and are subject to review and acceptance by the Archaeology Branch.

Acknowledgements

CREDITS

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KSM PROJECT
ARCHAEOLOGICAL IMPACT ASSESSMENT, FINAL REPORT – *HERITAGE INSPECTION PERMIT 2008-0128*

Table of Contents

List of Figures

FIGURE **PAGE**

List of Tables

TABLE **PAGE**

List of Plates

List of Appendices

Glossary and Abbreviations

Terminology used in this document is defined where it is first used. The following list will assist readers who may choose to review only portions of the document.

AIA	Archaeological Impact Assessment
AOA	Archaeological Overview Assessment
Archaeology Branch	Archaeology Branch of the British Columbia Ministry of Forests, Lands and Natural Resource Operations
BC	British Columbia
BC DOM	British Columbia Department of Mines
BP	Years before present (1950 AD)
CCAR	Coulter Creek Access Road
CMT	Culturally modified tree
CWH	Coastal Western Hemlock (ecological zone)
DBS	Depth below surface
ESSF	Engelmann Spruce – Subalpine Fir (ecological zone)
GIS	Geographic Information System
GPS	Global Positioning System
HBC	Hudson's Bay Company
HCA	*Heritage Conservation Act* (1996)
KSM	Kerr-Sulphurets-Mitchell
LiDAR	Light Detection and Ranging
LRMP	Land and Resource Management Plan
masl	Metres above sea level
MH	Mountain Hemlock
MRSF	Mitchell Rock Storage Facility
MTRSF	McTagg Rock Storage Facility
NTS	National Topographic System
PSSR	Plant Site Spur Road
Project, the	The KSM Project
RAAD	Remote Access to Archaeological Data online application
Rescan	Rescan Environmental Services Ltd.
RSF	Rock Storage Facility
Seabridge	Seabridge Gold Inc.
SRSF	Sulphurets Rock Storage Facility

TAR	Teigen Access Road
TCAR	Treaty Creek Access Road
TDPR	Tunnel Divide Portals Spur Road
THREAT	Tahltan Heritage Resource Environmental Assessment Team
TMF	Tailing Management Facility
USGS	US Geological Survey
wilp	The *wilp* is a basic matrilineal kinship unit among some First Nations in northwestern British Columbia.
XRF	X-Ray Fluorescence

1. Introduction

Rescan Environmental Services Ltd. (Rescan) was retained by Seabridge Gold Inc. (Seabridge) to conduct an Archaeological Impact Assessment (AIA) for the potential KSM Project (the Project). This report presents the final results of the AIA.

The Project is a gold/copper project located in the mountainous terrain of northwestern British Columbia, approximately 950 km northwest of Vancouver and approximately 65 km north of Stewart (Figures 1-1 and 1-2). The proposed Project lies approximately 20 km southeast of Barrick Gold's recently-closed Eskay Creek Mine and 30 km northeast of the Alaska border. Watersheds in the northern and western portions of the Project area drain towards the Unuk River, which crosses into Alaska and enters the Pacific Ocean at Burroughs Bay. The eastern part of the Project area drains towards the Bell-Irving River, which joins the Nass River, and empties into the Canadian waters of Portland Inlet. Elevations in the Project area range from under 240 m at the confluence of Sulphurets Creek with the Unuk River, to over 2,300 m at the peak of the Unuk Finger.

This AIA was conducted in accordance with *Heritage Conservation Act* (HCA; 1996) Heritage Inspection Permit No. 2008-0128, issued by the Archaeology Branch of the British Columbia Ministry of Forests, Lands and Natural Resource Operations (Archaeology Branch). Portions of AIA study area are in the asserted traditional territories of the Tahltan Nation the Gitanyow First Nation, Gitxsan First Nation, and the Skii km Lax Ha. The Project is also within the Nass Area, as defined by the *Nisga'a Final Agreement Act* (2000).

The layout of this report is as follows: Section 1 describes the Project, the study objectives, potential effects on archaeological sites, First Nations and Nisga'a Nation communications, and archaeological issues raised during consultation; Section 2 describes the Project setting, including the paleoenvironment, effects of volcanism, biogeoclimatic zones, ethnographic background, historic background and built heritage, palaeolontology, previous archaeological research, and designated heritage sites and trails; Section 3 describes the methodology; Section 4 describes the results; Section 5 describes identified heritage concerns; Section 6 provides an evaluation of site significance; Section 7 discusses the assessment of impact potential and management recommendations; Section 8 provides conclusions; and Section 9 is an evaluation of the conducted research.

Assessment area photos are provided in Appendix A; shovel test descriptions are in Appendix B; maps showing the locations of shovel tests and pedestrian survey are in Appendix C; archaeological site data are provided in Appendix D; Appendix E contains a memo regarding archaeological potential for ice patches and glaciers; Nisga'a Nation Boundaries and asserted traditional territory boundaries of First Nations in relation to the Project area are presented in Appendix F; and geographic place names are listed in Appendix G.

1.1 KSM PROJECT DESCRIPTION

The proponent for the Project is Seabridge Gold Inc., a publicly traded junior gold company. The Project is a proposed gold/copper mine and related infrastructure located in northwestern British Columbia, north of the community of Stewart.

The layout and design of the Project are continuing to be developed by Project engineers. The AIA was designed with consideration of the Project description presented below, but was sufficiently broad to address a wide range of alternatives that have been assessed from an engineering and cost perspective at various times during the AIA.

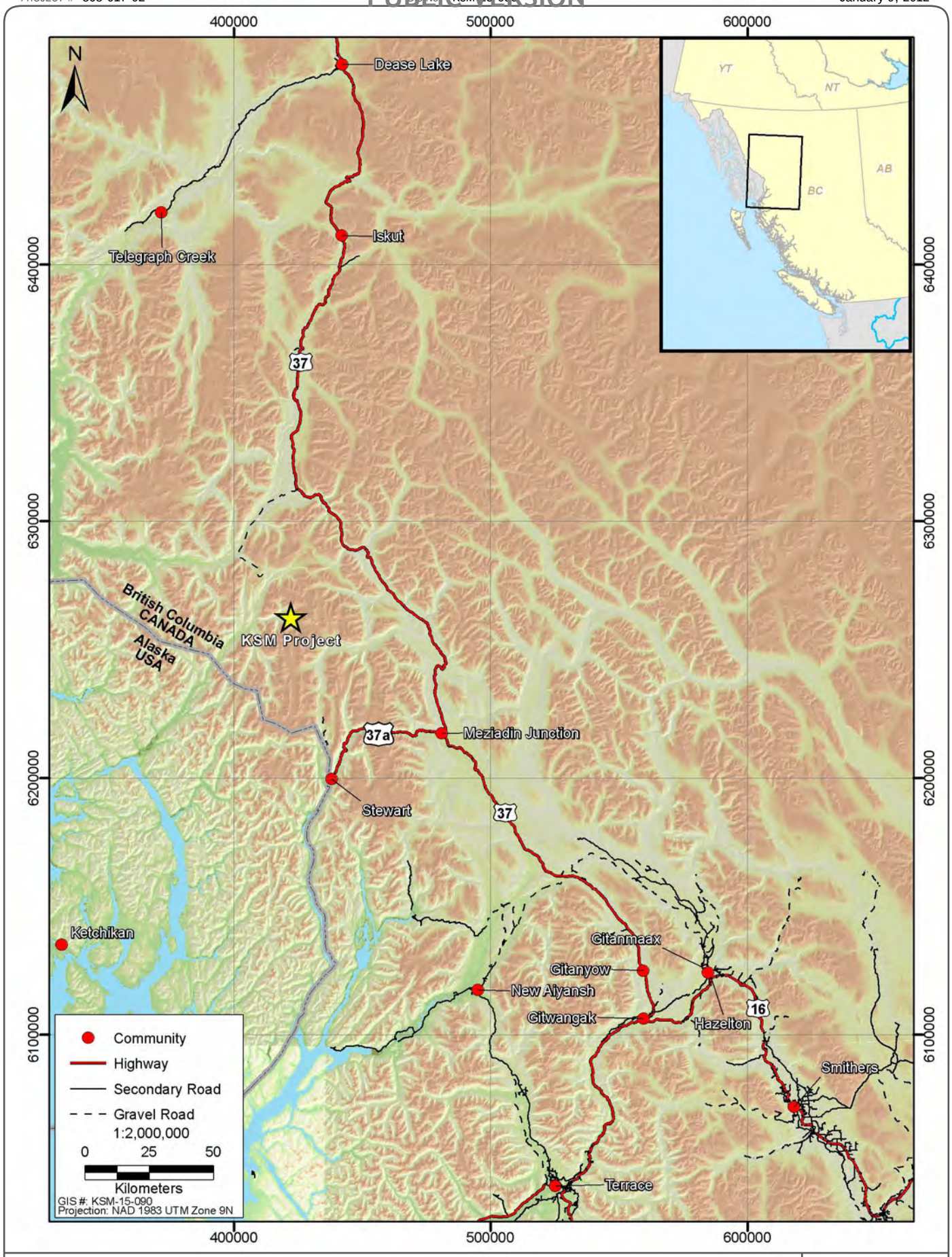

Figure 1-1

KSM Project Location

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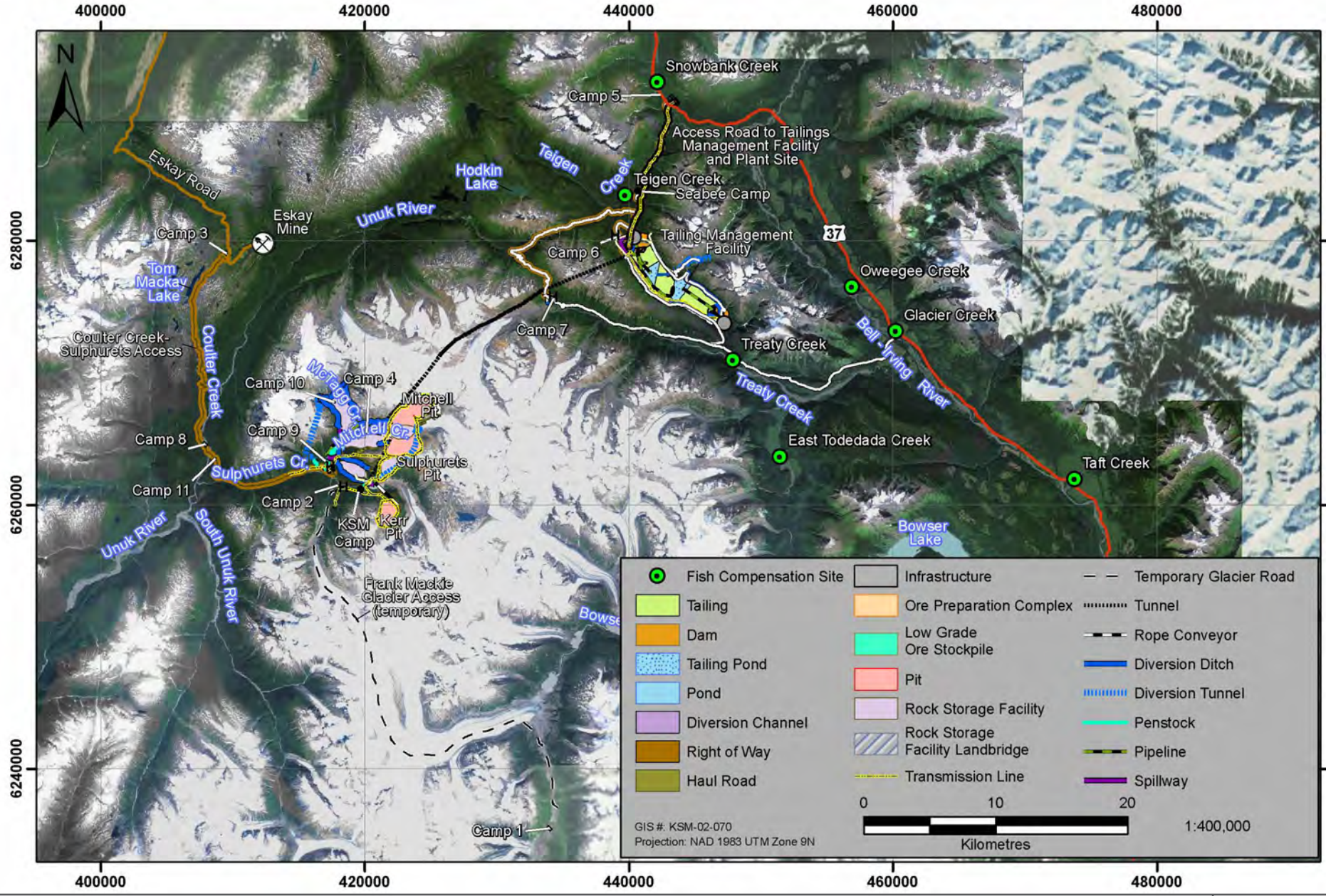

Figure 1-2

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KSM Project Layout and Road Access

Figure 1-2

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Engineers & Scientists

The Project, as defined for the purposes of this AIA, comprises two distinct geographically separate areas: (1) the mining area and (2) the process plant and tailing management area (Figure 1-2). The two areas will be connected by a pair of parallel ore conveyor tunnels. The mining area will be located in the drainage basin of Sulphurets Creek, a major tributary of the Unuk River. Access to the mining area will be from the existing Eskay Creek Mine Road via a newly constructed road across the Unuk River and up the Sulphurets Creek Valley. The processing plant and Tailing Management Facility (TMF) will be located near tributaries of Teigen and Treaty creeks, which flow into the Bell-Irving River. An access road will be constructed from Highway 37 along either the Teigen or Treaty Creek valleys to the process plant site and TMF.

1.2 STUDY OBJECTIVES

The primary objectives of this AIA were to:

- identify and evaluate any archaeological sites located within and adjacent to the impact zone of proposed Project development;
- identify and assess possible impacts of proposed development on any identified archaeological sites;
- provide recommendations regarding the need for and scope of any further archaeological investigations prior to initiation of any proposed development; and
- recommend viable alternatives for managing adverse effects.

1.3 POTENTIAL EFFECTS ON ARCHAEOLOGICAL SITES

Developments that involve the movement, excavation, or disturbance of soils have the potential to affect archaeological materials, if present. Project activities that could potentially negatively affect archaeological sites are anticipated to include the clearing and grading of roads and power line right-of-ways; clearing, grading, and excavation of building foundations and footings; earth moving and blasting during mine construction; and inundation of the TMF.

1.4 FIRST NATIONS AND NISGA'A NATION COMMUNICATIONS

On March 14, 2008, the Archaeology Branch forwarded a copy of the HCA permit application for the Project to the following groups: the Gitxsan Treaty Office, Iskut First Nation, Nisga'a Lisims Government, Tahltan Band, Tahltan Central Council, the Skii km Lax Ha Nation, Wilp Spookw/ Guuhadakw/Yagosip, and Wilp GwininNitzw of the Gitxsan for their review and comments. On April 17, 2008, the Archaeology Branch issued Heritage Inspection Permit 2008-0128 and forwarded a copy to the groups listed above. On August 8, 2011 the Archaeology Branch sent copy of the request to amend the permit to expand the study area boundaries to the groups listed above for their review and comment, and on October 4, 2011 a copy of the amended permit was sent to the groups. A copy of the final permit report will also be sent to the groups listed above. Members from all of the First Nations, and the Nisga'a Nation including those with knowledge of archaeological resources in the study area, were invited to participate in fieldwork. Individuals who participated in the fieldwork are listed in the Acknowledgments section.

1.4.1 Tahltan Archaeological Issues Raised During Consultation

The Tahltan have identified a number of archaeological issues that are considered to be priorities for archaeological studies conducted in their traditional territory (Appendix F-2). These archaeological issues include (1) ice patch and glacier sites; (2) cave and rock shelter sites; (3) cairns; (4) trails; (5) ancient continental movement of obsidian from *Ah-zeeth-zaa* (Mount Edziza); (6) cultural history,

including radiocarbon dating, obsidian hydration, tephra layers; and (7) regional archaeology (Asp 2006; THREAT 2011).

During this AIA, several steps were taken to address these issues. Eleven obsidian artifacts from sites identified during the AIA were sent for X-Ray Fluorescence (XRF) testing to determine the obsidian source. Mount Edziza is one of the largest obsidian sources in British Columbia, and it is located approximately 150 km north of the Project. Obsidian from this source was widely traded and has been found in the archaeological record in British Columbia, the Yukon, and southeast Alaska (Van Dyke and Jackson 1981; Carlson 1994; Cook 1995; Lee 2001). All cairns or rock structures encountered in the field were recorded. The majority of these structures were related to prospecting; however, one petroform of unknown antiquity was recorded as an archaeological site (Section 5.1.2.18). All rock cliffs or caves encountered in the field were inspected for archaeological materials, and a survey of glacial margins and ice patches in the Project area was undertaken (see Section 4.4.2).

2. Project Setting

This section describes the Project setting, including the natural environment, the cultural and historic setting, and the archaeological background. A description of notable geographic place names in the region is provided in Appendix G.

The Project is located in the Coast Mountain Range within the Canadian Cordilleran physiographic region of British Columbia (Demarchi 2011). The Project area is characterized by a rugged and mountainous topography formed through tectonic, volcanic, and glacial processes. Higher elevations remain heavily glaciated, with unglaciated terrain varying from subalpine meadows, parkland, and wetlands, to barren alpine environments. On mountain slopes, glacier-fed run-off drainages have incised narrow, steep-walled gullies that feed into broad U-shaped valleys.

2.1 PALEOENVIRONMENT

During the Wisconsinan Glaciation of the Late Pleistocene epoch, this area was covered by the Cordilleran ice sheet. The thickness of the Cordilleran ice sheet varied considerably, as thick as 2 km in some areas, but was generally thinner towards its western margin. Ice-free land (*nunataks*) may have protruded through the ice sheet, but would not have supported much flora or fauna (Fladmark 2001). The Early Holocene epoch saw rapid deglaciation as the warmer climate caused the Cordilleran ice sheet to recede from the coast to the interior. This resulted in the re-deposition of material collected in the glaciers as moraines and outwash. The ice sheets were roughly at their present sizes 9,500 years ago. Pioneer plant species that were well-adapted to a cool, dry environment (e.g., lodgepole pine, shrubs, and willow) initially thrived (Clague 1989).

A warming trend between 7,000 and 5,000 BP, the Hypsithermal Interval, saw temperatures rise to approximately 2 to 3ºC warmer than what they are today (Fladmark 1985). This caused further glacial retreat, and subalpine parklands expanded into higher elevations that were previously treeless. About this time (8,200 to 3,500 BP), the diversity of flora was increasing, with Sitka spruce, mountain and western hemlock, and alder becoming established in new areas (Heusser 1960). The Neoglacial Period of the past 5,000 years has seen fluctuating temperatures and an overall cooling trend. The Neoglacial Period culminated with the Little Ice Age (1250 to 1850 AD), which resulted in a major advance of glaciers, some entirely filling the coastal bays and fjords in southeast Alaska (Fladmark 2001). In the past several hundred years, a warming trend has sent these glaciers into retreat.

2.2 EFFECTS OF VOLCANISM

The Project is located within the Stikine Volcano Belt in the active Iskut River area. The area consists of a complex of eight recent volcanic centres, with at least 12 volcanic flows dating to between 70,000 and 150 years ago (Table 2.2-1; Wood and Kienle 1992; Hauksdottir, Enegren, and Russell 1994; Hickson and Edwards 2001; Geological Survey of Canada 2010). The Iskut River Cone, Lava Fork and Second Canyon Cone volcanoes are of greatest archaeological interest, as they have been active during the Holocene and would have impacted the landscape, waterways and fisheries.

Lava Fork is believed to be the youngest volcano in Canada, last erupting approximately 150 years ago. At least three flows of lava occurred, spreading south down the Lava Fork and Blue River valleys for approximately 20 km. The resulting damming created a number of lakes, including Blue Lake in Alaska and Lava Lake in British Columbia. The first canyon on the Unuk River was formed at its confluence with the Blue River by the river's subsequent erosion through the lava. The second and third canyons upstream were similarly caused by damming from undated lava flows from the Second Canyon Cone (Geological Survey of Canada 2010).

Table 2.2-1. The Iskut River Group of Volcanoes

Volcano	Last Eruption	Distance from the Project
Lava Fork	Holocene (~150 BP)	24 km southwest
Iskut River Cone	Holocene (< 2,555 BP)	8 km northwest
Cone Glacier	Holocene	9 km west
Second Canyon Cone	Holocene	17 km southwest
Snippaker Creek	Holocene	20 km west
Cinder Mountain	Pleistocene	6 km west
King Creek	Pleistocene	10 km west
Tom Mackay Creek	Pleistocene	8 km northwest

Source: Geological Survey of Canada (2010).

The Iskut River Cone has produced at least 10 lava flows since 70,000 BP. Specific flows have been dated to 6,500 to 6,800 BP, 5,600 BP, and 3,800 BP. Additionally, two flows post-date 2,555 BP, but have not been absolutely dated (Ian Hayward and Associates Ltd. 1982; Geological Survey of Canada 2010). The vents are on the south side of the Iskut River, near its confluence with Forrest Kerr Creek. Lava flows stretched 20 km down the Iskut River and dammed the river and several of its tributaries. The Iskut River Canyon, located approximately 10 km northwest of the Project area, was formed when the river cut a narrow gorge through the lava dam.

2.3 BIOGEOCLIMATIC ZONES

The Project area falls primarily within three biogeoclimatic zones: Coastal Western Hemlock, Mountain Hemlock, and Engelmann Spruce – Subalpine Fir. For specific information on to the flora and fauna in the Project area, please refer to the *Vegetation and Ecosystems Baseline* (Rescan 2010a) and *Wildlife Baseline* (Rescan 2010b) studies prepared for the Project.

Lower elevations along the Unuk River, Sulphurets Creek, and the adjacent valley-bottoms fall within the Coastal Western Hemlock (CWH) zone. The CWH zone is characterized by a dense canopy of western hemlock, with black cottonwood present in poorly drained areas and floodplains. This canopy keeps the forest floor relatively clear of snow most of the year. Of the three zones, CWH's climate is most heavily influenced by coastal marine factors, resulting in proportionately less precipitation falling as snow (up to 50% of the 1,000 to 4,400 mm annual precipitation). Wildlife in this zone is diverse and may include black-tailed deer, black bear, grizzly bear, mountain goat, and grey wolf, as well as a large variety of birds such as owls, Stellar's jay, woodpeckers, grouse, and common raven. Both fresh and anadromous fish species are present in the region, including chinook and sockeye salmon, rainbow and lake trout, and Dolly Varden (Meidinger and Pojar 1991).

The Mountain Hemlock (MH) zone is found southwest of Tom Mackay Lake and along the Unuk River and Sulphurets Creek Valley walls. Mountain hemlock, amablis fir, and yellow cedar are the dominant tree species, with some subalpine fir. With increasing elevation, the forest cover decreases, and subalpine parkland with patchy distribution of trees becomes common. The MH zone has a short growing season with 700 to 5,000 mm of annual precipitation, 20 to 70% of which falls as snow. Wildlife is less diverse than in other zones due to its typically steep rugged landforms and glaciers. Large mammals are generally restricted to south facing outcrops or subalpine parklands, and may include grizzly bear and mountain goat. Birds in the MH zone include golden eagles, ptarmigans, owls, woodpeckers, and various other smaller species (Meidinger and Pojar 1991).

The Engelmann Spruce – Subalpine Fir (ESSF) zone is located upstream of the Unuk River and along the valleys of the upper Nass watershed (e.g., Treaty and Teigen creeks). This zone covers a similar elevation range as the MH zone, but because it is located further inland, the climate is drier and more continental. The ESSF zone is characterized by long cold winters with a short growing season. Engelmann spruce and subalpine fir are the dominant tree species. Half of the annual precipitation (700 to 2,200 mm) falls as snow, and the climate is colder, as compared to the CWH and MH zones. This results in a deeper snow pack, often several metres thick. Black bear, grizzly bear, and moose are common in this zone, especially in subalpine parkland areas, and some fur-bearing species such as marten, fisher, wolverine, and red squirrel are also found here. Additionally, mountain goats and golden eagles are common to the ESSF but are typically found along south-facing terrain (Meidinger and Pojar 1991).

2.4 ETHNOGRAPHIC BACKGROUND

The AIA study area is situated within the overlapping asserted traditional territories of the following Aboriginal groups: the Gitxsan Nation, Gitanyow Nation, Skii km Lax Ha, and Tahltan Nation. The Project also falls within the Nass Area as defined by the *Nisga'a Final Agreement Act* (2000), where the Nisga'a Nation has treaty rights. In addition, during the early historic period an Aboriginal group known as the Tset'saut occupied portions of the Project area; however, by the early twentieth century they had suffered catastrophic population losses and by most accounts had ceased to exist as a distinct group (Duff 1981).

2.4.1 Tsimshian

Historically, ethnographers recognized four broad divisions of Tsimshian: the Southern Tsimshian, the Coast Tsimshian, the Gitxsan, and the Nisga'a (Halpin and Seguin 1990). The word *tsimshian* means "inside the Skeena River," and reflects cultural and linguistic similarities observed by the ethnographers; however, this does not necessarily reflect how these groups identify themselves or their social, political, or economic organization (Dunn 1995; Yinka Dene Language Institute 2006).

The AIA study area includes the asserted traditional territories of the Gitxsan (including Wilp Spookw/Guuhadakw/Yagosip and Wilp GwininNitzw), the Skii Km Lax Ha, and the Gitanyow (a politically autonomous group, previously treated by ethnographers as part of the Gitxsan). Groups belonging to the Southern and Coast Tsimshian are located outside the Project area, and are not discussed further.

Ethnographic studies of the Tsimshian culture group have been undertaken since the late 1800s; however, general observations have been made since European exploration began in the region in the late 1700s (Caamano 1938; Howay 1940; Moeller 1966; Colnett 2004). Some of the earliest ethnographic work in the region was conducted by Franz Boas (1895, 1902, 1916) who recorded a number of Tsimshian stories and myths in the early 1900s. Marius Barbeau and William Benyon also conducted extensive studies of Tsimshian culture in 1914 and again in 1923 and 1924 (Canadian Museum of Civilization 2005). Additional information can be found in the following sources: Adams (1973), Barbeau (1929, 1950a, 1950b), Benyon (1941, 2000), Berthiaume (1999), Daly (2005), Drucker (1965), Duff (1959, 1964), Dunn (1995), Garfield (1931, 1939), Gitxsan Chief's Office (2010), Halpin (1973), (Halpin and Seguin, 1990), Inglis et al. (1990), MacDonald and Cove (1987), McDonald (2003, 2006a, 2006b), McNeary (1976), Menzies (2006), Miller (1997), Miller and Eastman (1984), People of 'Ksan (1980), Sapir (1915, 1920), Seguin (1984, 1985), Shortridge (1919), and Sterritt et al. (1998).

Gitxsan

The term *gitxsan* translates as "people of the river of mist" (Gitxsan Chiefs Office 2010). Gitxsan oral history describes their origins at a village called *Temlaxam*, reportedly near the confluence of the

Skeena and Bulkley rivers. The Gitxsan abandoned Temlaxam and dispersed after a series of environmental catastrophes befell the village. Early historic accounts and oral histories describe that the Gitxsan organized into seven tribes, each having a different winter village, most located along the banks of the upper Skeena River. These villages were *Gitwangak* (*Kitwanga*), *Gitanyow* (*Kitwancool*),[2] *Kitsegyukla* (*Gitksigyukla*), *Gitanmaax* (Hazleton), *Kispiox*, *Kuldo*, and *Kisgaga'as*. The villages were subdivided into four clans, kin groups which cross cultural and political divides, and houses (wilp). Houses are the major political and landowning unit and are based on an individual's matrilineage (Sterritt et al. 1998; Halpin and Seguin 1990).

The Gitxsan practiced a subsistence pattern focused on intense salmon harvesting during the summer months. Being located in a transitional area between coast and interior, Gitxsan subsistence strategies differed from more coastal groups, with an increased reliance on hunting and trapping of inland game (e.g., moose, mountain goat, marmot, grizzly bear, black bear, and beaver) and the intensive gathering of plant resources, such as soapberries (Halpin and Seguin 1990).

The *Xskiigmlaxha* (Ski km Lax Ha) are described in historic and ethnographic accounts as a northern house of the Gitxsan. Wilp Ski km Lax Ha belongs to the *Lax Ganeda* (Frog Clan), whose descendants trace their lineage to the village of *Ts'imanluuskeexs* near Bowser Lake and later the village of Kuldo (Sterritt et al. 1998). Published ethnographic information pertaining to the Ski km Lax Ha is limited.

Nisga'a

The Nisga'a traditionally inhabited the Nass River watershed, and speak a Tsimshian dialect similar to the neighbouring Gitxsan (Marsden et al. 2002). The Nisga'a have a matrilineal clan and house system of socio-economic organization. The Nisga'a clans (*Pdeek)* are the Wolf (*Laxgibuu*), Eagle (*Laxsgiik*), Killer Whale (*Gisk'aast*) and Raven (*Ganada*; Boas 1895; Halpin and Seguin 1990; Nisga'a Tribal Council 1992). The annual eulachon fishery on the Nass River allow the Nisga'a to produce eulachon oil, a highly-valued trade item that in historic times was moved inland along "grease trails" and exchanged with interior peoples. In historic times, Nisga'a villages, consisting of rows of small longhouses belonging to particular wilp, were situated along the Nass River. Today, there are four main Nisga'a villages: *Gingolx* (Kincolith), *Laxgaltsap* (Greenville), *Gitwinksihlkw* (Canyon City), and New Aiyansh.

2.4.2 Tahltan

The traditional territory of the Tahltan encompasses the upper Stikine River watershed, including the Spatsizi Plateau, the Dease Lake basin, and portions of the Tuya, Tahltan, Klappan, and Iskut watersheds (MacLachlan 1981). The Tahltan speak an Athabaskan language that is related to the Kaska Dena peoples of the Liard and Dease river drainages, and the Tagish peoples of the Yukon River drainage (Krause and Golla 1981). The word *tahltan* derives from a Tlingit word referring to an important trading ground at the mouth of the Tahltan River (MacLachlan 1981). The Tlingit were close trading partners who lived downstream on the Stikine River from the Tahltan.

Ethnographic research has been conducted in the Tahltan territory for approximately 100 years. The most extensive ethnographic information on the Tahltan can be found in the following sources: Albright (1980, 1982, 1983, 1984), Dawson (1887), Emmons (1911), Friesen (1985), Hodge (1912), Jenness (1927), MacLachlan (1981), McIlwraith (2007), Morice (1893), Teit (1906, 1912, 1956), Thompson (2007), Thorman (n.d.), and White (1913).

[2] The Gitanyow and Gitxsan First Nations are politically distinct groups.

In the early historical period the Tahltan were organized as seasonally mobile bands, a pattern typical of other interior Athabaskan peoples. They also shared a number of traits in common with their Tlingit neighbours, including a matrilineal kinship division of exogamous moieties (Raven or Wolf), and a seasonal round adapted to the abundant and predictable food resources the Stikine River afforded them; in particular, five species of salmon. Many Tahltan lived along the banks of the Stikine River during the summer months, harvesting and drying the fish. Salmon cannot proceed past the Stikine Canyon upstream from Telegraph Creek, and as a result the Stikine-Tahltan river confluence was a focal point of the Tahltan seasonal round. Following a September trading visit by the Tlingit, Tahltan families would disperse to the highlands to hunt and trap a variety of game, and to gather plant resources. Winters were spent at established winter camps, usually situated within sheltered valleys (Albright 1982, 1984).

MacLachlan (1981) and Albright (1984) identify six clan-affiliated Tahltan regional bands extant in the nineteenth century. Of these, the Nassgotin band is the most closely associated with the southern portion of Tahltan territory, near the Study Area. The Nassgotin are described in some historic and ethnographic accounts as aggressively advancing south during the nineteenth century, displacing the Tset'saut on the upper Nass, and establishing a fishing village on Meziadin Lake which remained until 1865 (Duff 1981).

2.4.3 Tset'saut

The Tset'saut were an Athapaskan-speaking people who once occupied the area "in and around the headwaters of the Nass, Skeena, and Stikine Rivers, at Meziadin Lake, and on the Unuk River, Observatory Inlet, Portland Canal, and Behm Canal" (Sterritt et al. 1998). Alternately, Duff (1981), describes the Tset'saut as occupying the land east of Behm Canal, the upper half of Portland Canal, and most of the Unuk River watershed, but not the Bowser and Meziadin lakes area. Due to rapid population loss during the nineteenth century, comparatively little ethnographic information was recorded about the Tset'saut. Ethnographic information on the Tset'saut can be found summarized in the following sources: Boas (1895, 1896, and 1897), Dangeli (1999), Duff (1959, 1981), Emmons (1911), and Sterritt et al. (1998).

The name *tset'saut* means "from the interior" in Tsimshian languages. Thorman (n.d.) identified three bands of the Tset'saut: the *Suss 'to Deen* (people of the black bear raiment) in the Unuk River region, the *Tse etseta* (people of the adult marmot headgear) further south, and the *Thlakwair khit* (those of the double walled houses) to the east. During the historic times, some of the western Tset'saut, weakened by population loss from disease and raids by their neighbours, moved to the Anglican missionary village at Kincolith, and joined the Nisga'a community there. One of the last ethnographic descriptions of Tset'saut as a distinct cultural affiliation was by Emmons in 1907, when at Kincolith he encountered seven individuals who identified themselves as Tset'saut living amongst the Nisga'a (Emmons 1911).

The Tset'saut practiced a highly mobile subsistence strategy focused on inland game, primarily marmot (Duff 1981). Travel was on foot or snowshoe, with men often travelling alone away from the main camps to hunt and trap. The Tset'saut were reportedly attacked and exploited by their neighbours in early historic times. The demise of the Tset'saut during the 1800s also approximately coincides with the most recent eruption of the Lava Forks volcano on the Unuk River.

2.5 HISTORIC BACKGROUND AND BUILT HERITAGE

2.5.1 Early European Contact

Initial European exploration of the West Coast of British Columbia was made by Russian, Spanish, and English maritime expeditions during the 1700s (Hayes 1999; Bown 2008). The earliest sustained European presence in the region was the Russian settlements in the Alaskan panhandle, including Novo

Archangelesk and Fort Dionysius (Smith and Barnett 1990; Hayes 1999). Novo Archangelesk was established in 1799 near the present-day town of Sitka, Alaska (300 km northwest of the Project area). It served first as the headquarters of the Russian-American Company and later as the capital of Russian America. Fort Dionysius was established in 1833 near the mouth of the Stikine River (110 km northwest of the Project area) and was a major entry point for European goods destined to be moved inland and traded for furs. Russian influence on the fur trade was waning by that time, and in 1840 the fort's operation was taken over by the Hudson's Bay Company (HBC) and renamed Fort Stikine. After the American purchase of Alaska from Russia in 1867, the fort was renamed Fort Wrangell.

Port Simpson (Lax Kw'alaams) was established north of Prince Rupert (200 km south of the Project area) in 1834 as a HBC trading post. Nearby Aboriginal people began to congregate around the fort, and the population soon numbered in the thousands (Large 1957). Anglican minister William Duncan arrived at Port Simpson in 1857; but upset by the sinful environment, he moved away from the fort to establish a community at Metlakatla in 1862. The HBC post burned to the ground in 1914, and as the heyday of the fur trade had passed, the fort was not rebuilt (Meilleur 1980).

2.5.2 Telegraph Line Construction

In response to the Klondike Gold Rush of 1897, a telegraph line from Ashcroft, British Columbia, to the gold fields of the Yukon was constructed by the Dominion Government, partially following the route of the incomplete Collins Telegraph Line, abandoned during the 1860s. The Dominion Yukon Telegraph Line was completed in 1901 and remained in operation until the 1930s (Newman 1995; Miller 2004). For more information on the Dominion Yukon Telegraph Line, refer to Sections 2.9, 5.1.1.10, and 5.1.1.12.

2.5.3 History of Mineral Exploration in the Project Area

During the Cassiar Gold Rush of the 1870s, placer gold was reported on the Unuk River, but at that time these reports did not garner much attention (Mertie 1921). In the early 1880s, prospectors spent several years extracting gold from the gravels of Sulphide (Sulphurets) Creek. To access their claims, they blazed a foot trail along the north bank of the Unuk River to Burroughs Bay (Wright 1907). The 1935 *Minister of Mines Annual Report* states that a prospector named O'Hara was the first person to find placer gold in 1893. He was followed by Ketchikan-based prospectors during the 1890s, including John W. Daily (also spelled Daley, Daly), F. E. Gringras, H. W. Ketchum, Lee Brant, and C. W. Mitchell (BC DOM 1936).

Between 1900 and 1903 the Unuk River Mining and Dredging Co. ran an extensive prospecting and placer mining operation at two claims. The Cumberland group of claims was located on Sulphurets Creek and the Globe group on the south fork of the Unuk River. A camp to support these operations was established on Unuk River near the British Columbia-Alaska border (BC DOM 1902, 1904, 1936).

A stamping mill for crushing ore was installed at the Globe claim. The mill could produce 10 horsepower from a 13-foot diameter overshot wheel. At the Cumberland claim, two 50-foot long tunnels were excavated. In 1901, $8,000 was spent on developing these two properties, including 35 miles of trail cut and 30 tons of ore prepared for shipment (BC DOM 1902). Additional work in the Unuk and Sulphurets valleys during this period included prospecting and claim staking, excavation of additional tunnels and open cuts, and the construction of cabins, blacksmith shops, and ore bins on the properties. H. W. Ketchum, who had been prospecting the Unuk River annually since the 1890s, also cut a number of trails. Early reports on the resource potential of the Unuk watershed were generally favourable, although the high water levels, typical of the glacially fed streams, were reported to be an impediment to summer prospecting (BC DOM 1904).

An additional impediment to prospecting, which would be a recurring theme in subsequent years, was difficulty of transportation into the region. The natural route to access the claims was through Alaska; up the Unuk River from the tidal waters at the head of Burroughs Bay. However, travel up the Unuk River was time consuming and treacherous. In 1903, it took the crews 15 days to reach the Globe and Cumberland claims from the mouth of the Unuk, a distance of approximately 70 km. The trek involved towing supply rafts up the river, then portaging and sledding them overland (BC DOM 1904). By 1903, John W. Daily had made significant progress in building a wagon road from Burroughs Bay to his property at the mouth of Sulphurets Creek. Daily's road generally followed the route of the old foot trail blazed by prospectors in the 1880s (BC DOM 1904, 1936; Figure 2.5-1). However, the wagon road was never finished, terminating several kilometres northeast of the international border. In addition, the Department of Mines 1919 and 1920 annual reports indicated that Daily had skipped building the road in two difficult sections, totalling 3,000 feet on the Alaskan side, where sheer bluffs abut the Unuk River (BC DOM 1920, 1921). Attempts to import additional machinery to the Globe and Cumberland claims along this trail was apparently met with failure, as later reports describe that pieces of equipment were found abandoned along the road and left to rust (BC DOM 1936).

In 1905, Dr. Fred E. Wright of the US Geological Survey undertook a survey of the Unuk River and its tributaries and in a short report published in the annual report for 1906 concluded that:

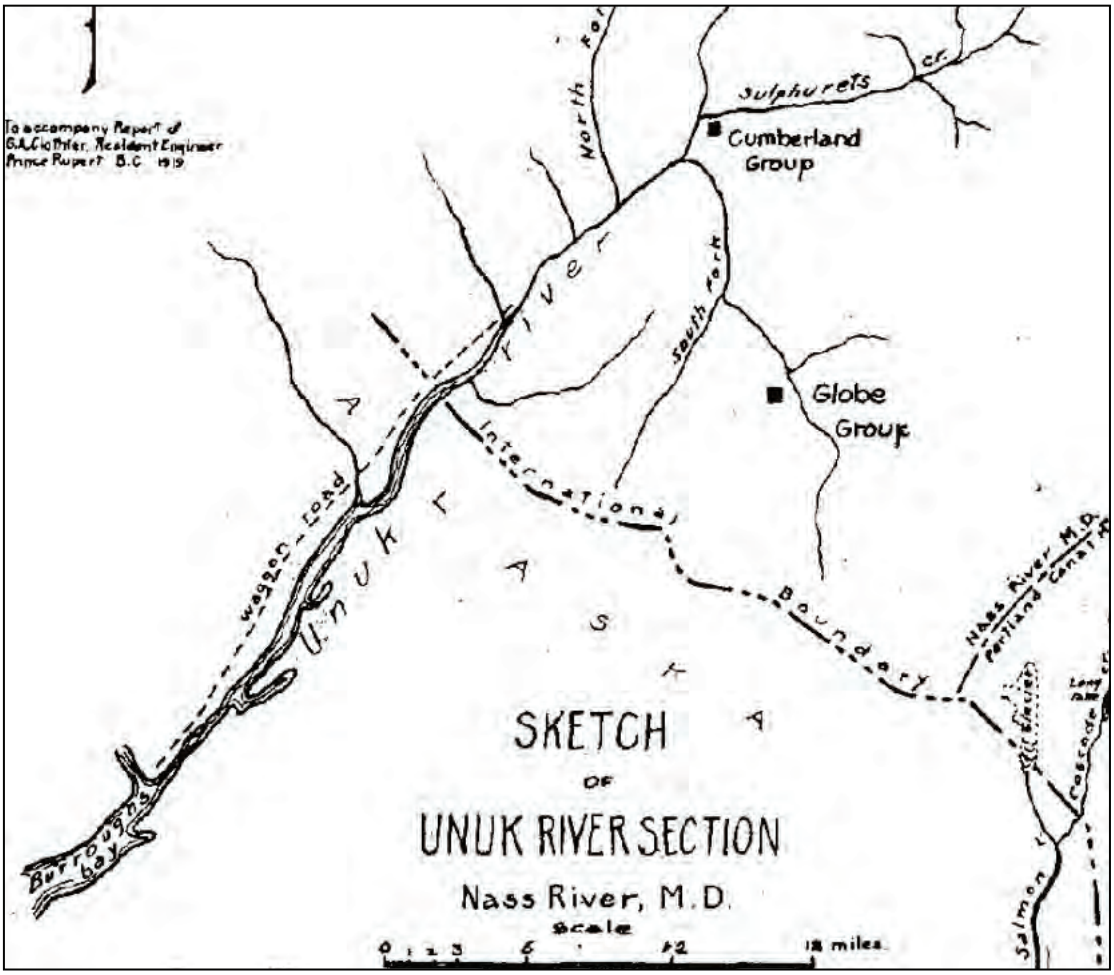
> *… the Unuk river merits investigation and may reward careful prospecting for ore-bodies. The difficulties of transportation which have been encountered heretofore will be materially decreased by the completion of the wagon road to Sulphide creek. Prospectors will then be able to devote a large part of their energy to the search for and development of metalliferous veins in the region* (Wright 1907).

Despite this, during the period between 1904 and 1928, only limited prospecting was done in the Unuk River region; however there is some indication that prospectors continued to access the Unuk to run traplines (BC DOM 1921). Although dredging leases had been secured for large areas of the Unuk and Sulphurets River gravels and machinery was on the ground, there is no indication that these were put to use during this time (BC DOM 1912). The rough terrain and the "transportation problem" (BC DOM 1904) up the Unuk was repeatedly identified as the primary impediment (BC DOM 1906, 1918, 1926). One report provides the following warning:

> *Let me impress it on intending prospectors in that area that they must know how to manage a river-boat or the one trip will be sufficient. The river is swift and dangerous, being deep in places and filled snags and log-jams* (BC DOM 1924).

A regional survey in 1920 by the BC Department of Mines scouted potential access routes and determined that a road south to Portland Canal would be impossible to build due to continuous glaciers. Repairing and completing the wagon road up the Unuk River was determined to be the only feasible option, although other passes into the Bell-Irving and Iskut River valleys from the Unuk headwaters were widely known (BC DOM 1921). During this period, British Columbia Department of Mines' staff suggested several times that the Alaskan and British Columbia governments negotiate an agreement to fund the completion of the unfinished wagon road to open up the region to prospecting (BC DOM 1923, 1932). Despite the favourable geology, abundant fast flowing water for running machinery, and good spruce and hemlock timber, the road never materialized.

In the fall of 1928, claims were staked along the north side of Treaty Creek (formerly 20 Mile Creek), east of the Unuk River. The claims were accessed from the south via trails from Meziadin Lake and the Nass River Valley. However, as the assay results proved to be low grade ore, the claims were subsequently abandoned (BC DOM 1930, 1931).



Source: BC DOM 1920

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Map from the Annual Report of the Minister of Mines, 1919

Figure 2.5-1

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Beginning in 1929, renewed interest in the mineral potential of the Unuk River watershed resulted in an influx of Ketchikan- and Stewart-based prospectors, including Tom McQuillan, T. Terwilligen, Arthur Skelhorne, and brothers Bruce and Jack Johnston. By 1932, the old wagon road was brushed out and cable crossings were built to facilitate access (BC DOM 1933). The prospectors staged their work from Ketchikan, travelling by boat to Harvey Matney's ranch at the head of Burroughs Bay (Matney Ranch). There they hired flat bottomed river boats to travel up the navigable portion of lower Unuk River. Beyond that point, a series of trails and cable crossings were used to access the claims further up the Unuk River (BC DOM 1936).

In 1932, the Mackay Syndicate, based in Premier, British Columbia, successfully landed a plane on Tom Mackay Lake, near their mineral claims in the region (BC DOM 1935, 1936). An assay outfit was flown in, and they began an exploration program that included excavation of open cuts and prospecting, with encouraging results (BC DOM 1936). However, for reasons that are not described in the Minister of Mines annual reports, possibly the onset of WWII, prospecting in the region came to a halt in 1940 (BC DOM 1941, 1942).

2.5.4 Recent History

The Stewart-Cassiar Highway (Highway 37), which runs east of the Project area, was built during the 1960s and 70s. The Bell II Crossing gas station and store, located near the second highway crossing of the Bell-Irving River, was established in 1979. Later additions have included a lodge and restaurant (Bell 2 Lodge 2009).

The first parks in the region were established in the 1970s, including Misty Fjords National Monument, southwest of the Project area in Alaska (established 1978), and the Ningunsaw Ecological Reserve in British Columbia (established 1975). In 2001, the Cassiar-Iskut-Stikine Land and Resource Management Plan (LRMP) established Ningunsaw Provincial Park adjacent to the Ningunsaw Ecological Reserve and Border Lake Provincial Park along the Unuk River at the British Columbia-Alaska border (BC Parks 2009).

2.6 PALAEONTOLOGY

Geologic mapping of the Project area at a scale of 1:100,000 was undertaken by Alldrick et al. (2006). Dominantly marine, deltaic meta-sediments, and sub-marine meta-volcanics of the Triassic to Jurassic age occur in the Project area. Alldrick et al.'s map outlines the boundaries of the Bowser Lake Group (Middle to Upper Jurassic), Hazelton Group (Lower to Middle Jurassic), and the Upper Triassic Stuhini Group. The map indicates localities where micro fossils and macro fossils have been observed in sediments of the Bowser Lake Group in the region.

All fossil locations recorded by Alldrick are at least 10 km from the proposed Project footprint. Since 2004, specific helicopter-supported paleontological field trips targeting potential fossils in the Bowser and Sustut basins were undertaken jointly by the Geological Survey of Canada, the Geological Branch of the British Columbia Ministry of Energy, Mines and Petroleum Resources, the Royal British Columbia Museum, and Simon Fraser University. Numerous significant fossil finds, such as dinosaur foot prints, turtle shells, and fern and ginko leaves were made in sediments of the Bowser Basin in remote locations of northwestern British Columbia (Evenchick et al. 2005). No significant fossils have been identified within the Project area.

While the depositional environment of Mesozoic rocks in the Project area had the potential for preserving fossils, at least three tectonic events reworked the sediments. The structural phases were expressed by folding, faulting, and thrusting affecting all formations of pre-Quaternary age. These geological events suggest that it is unlikely that undisturbed macro fossils of significant size will be located within the Project footprint (G. Jacob, pers. comm.).

2.7 PREVIOUS ARCHAEOLOGICAL RESEARCH

Previous archaeological investigations in northwestern British Columbia have been undertaken for mining, hydroelectric and other developments, as well as several large-scale research projects. The geographic focus of these investigations has been primarily along major rivers (Stikine, Tahltan, Iskut, Nass, and Klappan) and within Mount Edziza Provincial Park. As a result, hundreds of archaeological sites have been recorded in the region; however, prior to this AIA very little archaeological investigation had been conducted in proximity to the Project area.

The previous archaeological investigations most relevant to the Project are described below in Sections 2.7.1 to 2.7.3. Other studies conducted in the broader region include Albright (1980, 1982, 1983, 1984); Apland (1980); Balcom (1986); Bussey (1985); Engisch and Bible (2009); Engisch et al. (2008); Engisch et al. (2011); Fladmark (1984, 1985); French (1980); Friesen (1983, 1985); Hall and Prager (2004, 2006); Ham (1987, 1988); Hrychuk et al. (2008); Jackman and Craig (2011); Magne (1982); Marshall, Marr, and Palmer (2008); Marshall and Palmer (2010); Pegg and Dodd (2007); Seip, Farquharson, and McKnight (2009); Seip and McKnight (2009); Seip, Farquharson, et al. (2011); Seip, McKnight, et al. (2011); Seip, Walker, et al. (2011); Walker and McKnight (2011); Warner and Magne (1983); Wilson (1984); and Wilson et al. (1982). Additional unpublished archaeological work near the study area has been conducted under permits 2006-0223, 2007-0163, 2007-0200, and 2007-0258. Data on the Remote Access to Archaeological Data (RAAD) online application and other publically available information on these projects were reviewed when practicable.

2.7.1 Sulphurets Property Access Roads Development

In 1987, a heritage resource overview assessment was conducted on a proposed road alignment to the Sulphurets property, which was being explored at that time by Newhawk Gold Mines Limited (Bussey 1987a, 1987b). This proposed road alignment ran west from Highway 37 along Treaty Creek, Scott Creek, Bowser River, and then northwest past Knipple and Brucejack lakes.

The AIA consisted of background research, a review of area and project maps, and a helicopter fly-over to assess potential. Archaeological potential was rated as moderate on the east side of the crossing of the Bell-Irving River and low along the north side of Treaty Creek. Some segments along the north side of the upper Bowser River were rated as low to moderate. Ground examinations were conducted at two locations: the east side of the Bell-Irving River crossing and an elevated landform on the north side of the upper Bowser River. No archaeological sites were identified (Bussey 1987a, 1987b).

2.7.2 Eskay Creek Mine Project

In 1990, a heritage resource inventory and impact assessment study was conducted for the Eskay Creek Mine under Heritage Inspection Permit 1990-0081 (Rousseau 1990). This project is located immediately north-northwest of the Project area, between Little Tom Mackay Creek (to the west) and Ketchum Creek (to the east).

Areas assessed included proposed tailing ponds (raising the water levels of Tom Mackay and Little Tom Mackay lakes), an open pit mine area, waste rock dump, pipeline right-of-way, and ancillary project components. On the basis of a helicopter reconnaissance of the project area, the archaeological potential of the Eskay Creek Mine development area was rated as generally low. The in-field focus was on the shorelines of four lakes that would be impacted (including Tom Mackay Lake), and the main valley bottom of Eskay Creek from its headwaters to the Eskay/Calpine Camp, a distance of approximately 3 km (Rousseau 1990).

An isolated lanceolate chert biface was found on the lakeshore north of Little Tom Mackay Lake. As this was an isolated find and subsequent shovel tests in the vicinity did not result in additional archaeological material, it was not recorded as an archaeological site. However, the biface is of interest because it is similar to lanceolate projectile points found elsewhere in British Columbia that date to 9,000 to 5,000 BP (Rousseau 1990; also discussed in Brolly 1990). Several post-1930s mining camps and other physical remains from mineral exploration were identified during the assessment, but were not rated as having archaeological significance.

2.7.3 Iskut Mine Access Road Development

An access road alignment to the proposed Iskut Mine site was assessed in 1990 (Brolly 1990). The route of the road alignment was from Bob Quinn Lake, southwest to an exploration camp (Prime Resources' Eskay Camp), then west to the Bronson Camp, a distance of approximately 93 km.

The heritage site overview assessment consisted of interviews with Iskut First Nation members, background research, and a helicopter reconnaissance of the project area. Eight areas of archaeological potential were identified and assessed on the ground. One historic site (HcTp-1), a historic cabin, and a trail near the Unuk and South Unuk River confluence, was recorded (see Section 5.1.1.3). Another trail was described by an Iskut community member as running from the Unuk River to the Ningunsaw River via Teigen Lake. The report recommended that further archaeological assessment be conducted “if and when the mine access road is extended south from the Eskay Camp down the Unuk River Valley” (Brolly 1990).

2.8 PREVIOUSLY RECORDED ARCHAEOLOGICAL SITES

Fourteen previously recorded archaeological sites situated within the Project area were identified using the RAAD database (Table 2.8-1; Figure 2.8-1). Five of these sites were revisited during the AIA, and four were recorded by Rescan during other AIA studies in the area. Please see Section 5.1.1 for additional information on these sites.

Table 2.8-1. Previously Recorded Archaeological Sites within the Project Area

Site	Location
HcTj-1	On the north shore of Bowser Lake
HcTn-1	West of Brucejack Lake
HcTp-1	East bank of Unuk River, south of Sulphurets Creek
HdTj-1	Near the Bell-Irving River/Treaty Creek confluence
HdTk-1	On the east bank of Oweegee Creek
HdTk-2	Located on a secondary channel of the Bell-Irving River southeast of Oweegee Creek
HdTk-3	On the north shore of Gilbert Lake
HeTk-1	On a small raised feature overlooking Oweegee Creek
HeTk-2	On the south bank of Hodder Creek
HeTk-3	Located on a terrace north of Highway 37
HeTl-1	Southwest of Snowbank Creek
HeTl-2	Near the confluence of Snowbank and Teigen creeks
HfTm-2	Located on a cutbank overlooking Highway 37 north of Beaverpond Creek
HfTm-3	Located on a cutbank overlooking Highway 37 south of Beaverpond Creek

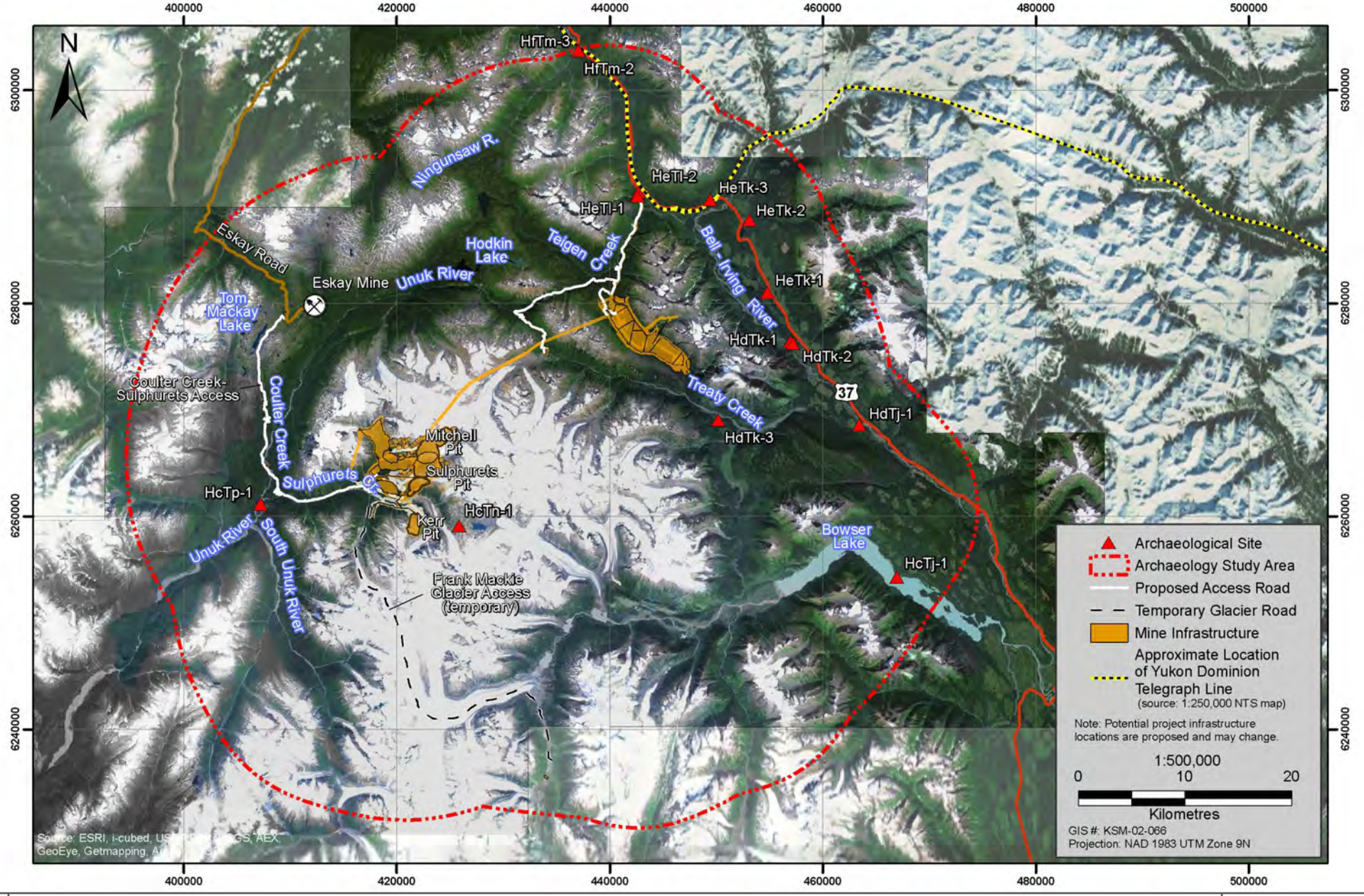

Figure 2.8-1

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Previously Recorded Archaeological Sites and Desgnated Heritage Sites in the Study Area

Figure 2.8-1

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2.9 DESIGNATED HERITAGE SITES

The Regional District of Kitimat-Stikine's Community Heritage Register was reviewed to identify any designated heritage sites in proximity to the Project area. One designated heritage site, the Dominion Yukon Telegraph Line, is in proximity to the Project. The telegraph line ran along the north side of the Bell-Irving Valley from Rochester Creek to Snowbank Creek. From Snowbank Creek, the telegraph line headed north towards Echo Lake.

2.10 ETHNOGRAPHICALLY AND HISTORICALLY DOCUMENTED TRAILS

Historically and ethnographically documented trails and travel corridors that ran in proximity to the Project area are described below. In historic and prehistoric times, trails were important transportation corridors for First Nations, and in many instances historic trails and modern roads followed the routes of established Aboriginal trails (MacDonald and Cove 1987). Although many of the major travel corridors followed rivers, travel on foot was often easier in the open terrain at higher elevations.

Stikine Trail

The Stikine Trail was one of the major routes from the Nass River to the Stikine River. From the Nass River, it ran north along the Bell-Irving River, Iskut River, then west through Raspberry Pass to Mess Creek, and then north to the Stikine River (MacDonald and Cove 1987). It is likely that this trail intersected a number of other trails travelling west to the coast and east inland. Portions of Highway 37 and the historic Dominion Yukon Telegraph Line likely followed segments of the Stikine Trail.

Fort Dionysus Branch Trail

This trail was a branch of the Stikine Trail to Fort Dionysus (later named Wrangell) in Alaska. It is described as being the shortest route to Fort Dionysus from the Stikine Trail (MacDonald and Cove 1987). The trail branched off the Stikine Trail at Bowser Lake and then ran along the north side of Bowser Lake to the Lower Iskut River. Its exact route is not described, but this trail may have run north through Scott Pass, along Treaty Creek, and through the Teigen and Unuk lakes area to the Iskut River.

Unuk River Trail

Several trails along the Unuk River have been recorded. At site HcTp-1, a trail was recorded on the east side of the Unuk River between Sulphurets Creek and the South Unuk River (Brolly 1990). Another trail is described in the *Report of the Minister of Mines, 1935* (BC DOM 1936), which contains a map illustrating the location of prospector cabins and a trail with cable crossings over the river. This trail runs from the Matney Ranch at the mouth of the Unuk River, up the west side of the river. The mapped trail ends north of the Unuk River/Sulphurets Creek confluence where a cable is shown crossing the Unuk River to the east side. This is likely the wagon road that John W. Daily began building in the early 1900s (see Section 2.5.3), which followed an older blazed prospectors trail. During the early twentieth century, there was a Tlingit eulachon fishing camp located at the mouth of the Unuk River (Goldschmidt et al. 1998; Allen 2003). Eulachon grease was widely traded by coastal peoples to inland groups along "grease trails," and it is possible that a route up the Unuk River could have been used prehistorically to move the eulachon grease inland.

Ningunsaw – Unuk Trail

Brolly (1990) describes a trail from the Ningunsaw River to the Unuk River headwaters, likely via Teigen Lake. Site HfTn-2, a trail along the north side of the Ningunsaw River, may be a segment of this trail (Marshall and Palmer 2010).

South Unuk River – Divelbliss Creek Trail

A map in the *Report of the Minister of Mines, 1935* (BC DOM 1936) shows a trail from the confluence of the Unuk and South Unuk rivers that ran southeast and south along the west side of the South Unuk River. It crossed Gracey Creek and continued southwest to Divelbliss Creek, where it crossed the South Unuk River and then followed Divelbliss Creek east for approximately 9 km. Here, the mapped trail ends abruptly, but it may have continued east through unsurveyed terrain described on the BC DOM (1936) map as a "high mountain range with continuous glacial fields to Salmon and Bowser River slopes." The trail was probably used by early prospectors to access the Globe group of claims.

3. Methodology

This AIA was conducted in accordance with HCA Heritage Inspection Permit No. 2008-0128, issued by the Archaeology Branch, and the *British Columbia Archaeological Impact Assessment Guidelines* (Archaeology Branch 1998).

3.1 BACKGROUND RESEARCH

Prior to conducting field assessments, background information was first reviewed for the study area and surrounding region. This particular avenue of investigation focused on examining documentary data including ethnographic, historic, and archaeological studies, reports, and records. Environmental baseline studies conducted for the Project by Rescan, including the *Vegetation and Ecosystems Mapping Baseline* Study (Rescan 2010a), *Wildlife Characterization Baseline* Study (Rescan 2010b), *Soils and Terrain Baseline Study* (Rescan 2010c), and *Fish and Fish Habitat Baseline Study* (Rescan 2010d), were also reviewed. In addition, Appendices F and L of the Nisga'a Final Agreement (1999) were reviewed as part of the AIA.

3.2 ASSESSMENT OF ARCHAEOLOGICAL SITE POTENTIAL

Terrestrial landforms and features, as well as accessibility to potential resources that may have been conducive for human habitation, were considered when determining archaeological site potential. Specific factors included proximity to existing or relic water sources, general slope aspects, available food resources, vegetation types and forest cover, proximity to travel routes/corridors, and proximity to previously recorded archaeological sites. Additionally, areas with the presence of micro-environmental features that have a tendency of being associated with archaeological sites were considered. These factors include small rises such as knolls, terraces, elevated areas adjacent to water, and breaks in slopes. Information collected from ethnographic records, publically available traditional use studies, historically documented activities, and previous archaeological studies for the region were also considered. Factors thought to constrain archaeological potential include unbroken slope, steep or rough terrain, poorly drained ground and areas exhibiting considerable previous disturbance such as avalanche and landslide areas.

Special attention was paid to examining high altitude areas (especially along glacial margins, ice patches, and within passes) for surficial finds.

A GIS-based potential model of the upper Bell-Irving Watershed (Pegg and Dodd 2007) covers a portion of the Project area. This model was reviewed and informed the assessment of archaeological potential for the Project; however, the model was not relied upon exclusively, and the archaeological potential of the Project was determined using the methodology described above.

3.3 FIELD METHODS

Field methods employed during this AIA were consistent with those outlined in the permit application for Heritage Inspection Permit 2008-0128. Archaeological surveys focused primarily on the areas within the proposed development that were identified as having moderate or higher potential for the presence of archaeological resources. However, the AIA also incorporated a stratified random sampling strategy, including subsurface shovel testing, of no less than 15% of those areas identified as having low potential. Assessments of the proposed development areas took place in 2008, 2009, 2010, and 2011, and included pedestrian surveys and subsurface shovel testing as a means of identifying archaeological sites. Fieldwork was directed by Mike Will (B.A.), Lisa Seip (M.A.), Sean McKnight (B.A.), Kay

Farquharson (B.A.), and Daniel Walker (M.A.). The field crew included Jordan Ardanaz (B.A.), Vanessa Neuman (B.A.), Joel Kinzie (B.A.), and Michael Campbell (B.A.) from RTEC; Brandon Simpson from the Skii Km Lax Ha; Jarvis Williams and Guy Morgan from the Gitanyow First Nation; Mark Marion, Chris Snoeys, Alvin Tashoots, Calvin Tashoots, and Blaine Lindstrom from the Tahltan Nation; Travis Robinson, Neil Smythe, Alan Gonu, and George Gosnell from the Nisga'a Nation; and Peter Van Tunen and Lorne Williams from the Gitxsan First Nation.

Pedestrian surveys focused on areas within the proposed development identified as having potential for the presence of archaeological resources. Surveys consisted of a combination of systematic and judgmentally selected ground surface traverses. Areas along the proposed access roads selected for examination were surveyed following the proposed rights-of-way and had crew members spaced at approximately 10 m intervals, varying slightly depending on terrain and visibility constraints. For all other developments, systematic survey traverses followed compass bearings and Universal Transverse Mercator coordinates, with crew members spaced at 5 to 20 m intervals. Some variability occurred depending upon terrain and visibility constraints, as well as the assessed archaeological potential of the area being examined. Additional judgmentally selected survey routes followed spatially restricted topographic features. Ground surfaces were examined for trails, structures, artifacts, depressions, and other evidence of past human settlement and land use. Tree throws were also visually examined for such evidence. Standing trees, fallen logs, and stumps were examined for cultural modification, and bedrock exposures and boulders were inspected for pictographs and petroglyphs, as well as for the possible presence of seams of flakable lithic raw materials. Ice patches, glacial margins, talus slopes, caves, or rock crevices encountered during surveys of proposed development areas were also examined for the possible presence of burials or other archaeological materials.

All identified archaeological sites were recorded in field notes, photographed, and mapped by hip chain and compass. Additionally, GPS coordinates were recorded, generally with better than ±10 m accuracy, depending on reception. The locations of all sites have been plotted onto the development plan and NTS maps. All archaeological sites were recorded on British Columbia Archaeological Site Inventory forms to be entered into the Provincial Heritage Register Database. No human remains or culturally modified trees (CMTs) that pre-date 1846 AD were recorded during the surveys conducted.

Shovel testing took place in areas identified as having potential for buried archaeological remains during the in-field assessment (i.e., on remnant river terraces, on prominent knolls, near trails where they cross streams, on benches along the banks of tributary streams, etc.). Shovel tests were a minimum of 30cm x 30cm to a maximum of 40cm x 40cm depending on subsurface deposits with the average test being approximately 35cm x 35cm. They penetrated both "A" and "B" soil horizons depending on the nature of the sediment accumulation and continued until unweathered "C" horizon sediments or bedrock was encountered. Backdirt from any tests was examined manually or screened through 6 mm mesh.

3.4 SIGNIFICANCE EVALUATION

The significance of sites recorded under this permit was determined using the checklist of criteria for site evaluation found in the *British Columbia Archaeological Impact Assessment Guidelines* (Archaeology Branch 1998). The scientific, public, ethnic, economic, and historic (if applicable) significance of each identified site was addressed when possible. As no previously unrecorded CMTs were located no CMT evaluations were required for this project.

3.5 DATA ANALYSIS METHODS AND TECHNIQUES

All collected artifacts have been catalogued, described, and compared to existing regional typologies. Any formed tools encountered were described, documenting shape, raw material, and manufacturing attributes. Appropriate metric attributes of artifacts were also recorded when warranted. Lithic debitage was quantified and classified according to raw material and stage of manufacture. No faunal materials were identified.

3.6 CURATION

As per Heritage Inspection Permit No. 2008-0128, subsequent to the completion of the final permit report, artifacts collected during this AIA and a copy of the final report will be sent to the Royal British Columbia Museum in Victoria, British Columbia.

4. Results

This section presents the results of the AIA and provides general descriptions of the environment associated with the Project footprint (Figure 1-2). For reporting purposes, the results section is divided into the following subsections: road alignments and transmission line, tailing management facilities and plant sites, mine pits, rock storage and other associated mining facilities, alpine/subalpine areas, exploration and construction camp locations, the switching station, and the fish habitat compensation areas. A total of 5,931 shovel tests were conducted at 348 locations. Photographs of the footprint components can be found in Appendix A, a table containing details on shovel test locations can be found in Appendix B, and detailed maps of the Project area with the survey and shovel test locations can be found in Appendix C. Project-related acronyms used in this section are defined in the Glossary and Abbreviations section.

The proposed Project area is characterized by steep topography with loose talus resulting from rockslides and slumps. Large portions of the property, particularly at the Kerr deposit, are located on steep slopes. Slope class mapping, generated from LiDAR data, was reviewed for the Project area to assist in the assessment of archaeological potential. The study area has been divided into six slope classes. Slope Class 4 (moderately sloping) is the most common slope class, representing 35% of the study area. Classes 5 and 6, described as moderately steep and steep slope classes, respectively, represent approximately 26% and 17% of the study area, respectively. These three slope classes make up about 78% of the study area. Approximately 45% of the slopes in the study area are greater than 50%. Only a small portion of the study area (approximately 1%), is classified as level to very gentle slope (Class 1; Rescan 2010c). In addition, baseline data for other sciences, such as fisheries, wildlife, and vegetation, as well as land use data, were also reviewed for the Project area (Rescan 2010a, 2010b, 2010c, 2010d, 2011).

4.1 LINEAR DEVELOPMENT FEATURES

There are seven currently proposed linear features, including six road alignments and a transmission line: the Treaty Creek Access Road (TCAR), Teigen Access Road (TAR), Plant Site Spur Road (PPSR), Tunnel Divide Portals Spur Road (TDPR), the Coulter Creek Access Road (CCAR), and the Temporary Glacier Access Trail; and a Transmission Line that follows the TAR for most of its length. These alignments are discussed in Section 4.1.1. Several additional road options that were previously under consideration but have since been eliminated from the Project footprint are discussed in Section 4.1.2. Slope class mapping, generated from LiDAR data, was reviewed for the areas within the Project area to assist in the assessment of archaeological potential (Figure 4.1-1; Rescan 2010c).

4.1.1 Current Road Alignment and Transmission Line Assessments

4.1.1.1 Treaty Creek Access Road

The proposed TCAR alignment runs through Treaty Creek Valley, beginning at Highway 37, and travels west along the north side of the valley for a total of approximately 32 km. A spur road runs approximately 11 km from the main TCAR to the process plant site (Figure 1-2). At the confluence of Treaty Creek and the Bell-Irving River, the terrain consists of low-lying and marshy flood deposits. As the valley travels west away from the confluence it becomes narrower and steeper, sided with intermittent terraces providing the only level ground (Plates A-1 and A-2 in Appendix A).

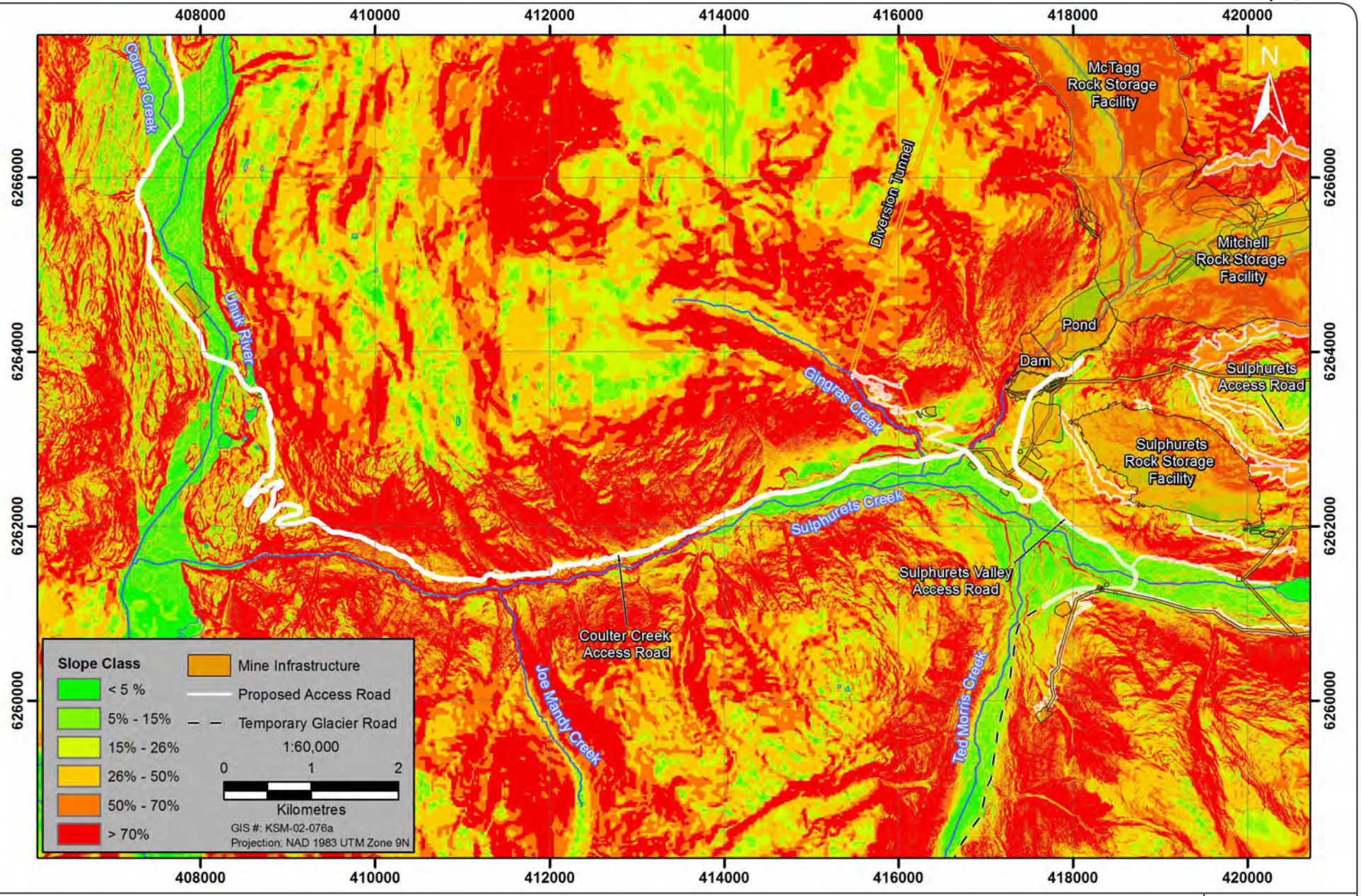

Figure 4.1-1

SEABRIDGE GOLD
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Project Components and Associated Slope Classes

Rescan Engineers & Scientists

Figure 4.1-1

Due to uneven and steep terrain, most of the road alignment was assessed as having generally low archaeological potential. Several areas along the road alignment were subject to pedestrian survey and shovel testing (Appendices B and C) to confirm this assessment. No new archaeological sites were identified during the survey; however, a possible historic knotted tree (Historic Feature B-7; Section 5.2.3) was recorded in the Treaty Creek Valley near Tim Williams Creek. Historic blazed and felled trees associated with a trail furrow, likely associated with mineral exploration, on the north side of the creek were also noted (Historic Feature B-16 to B-21; Section 5.2.3). Two previously recorded archaeological sites in the Treaty Creek area (HdTk-3 and HdTj-1) were revisited during the assessment to assess their conditions and confirm their locations. Archaeological site HdTk-3 is a lithic scatter on the north shore of Gilbert Lake (Section 5.1.1.7). HdTj-1, also known as the Treaty Creek Site, located on the southern side of the confluence of the Bell-Irving and River and Treaty Creek (15 km southeast of the Project), was designated under the terms of the Nisga'a Final Agreement (1999; Section 5.1.1.4).

4.1.1.2 Teigen Access Road and Transmission Line

The proposed TAR and transmission line alignments begins at Highway 37 near the confluence of Teigen and Snowbank creeks and run southwest along the eastern side of the Teigen Creek Valley to Seabridge's Seabee Exploration Camp for a total of approximately 8 km (Figure 1-2 and Maps A and B in Appendix C). It then divides into the Plant Site Spur Road (PSSR) and the TDPR. The terrain along this route consists of steep slopes along the valley walls, with uneven, rolling hills and some level ground along the valley floor (Plate A-3 in Appendix A). At the mouth of Teigen Creek near the confluence with Snowbank Creek, the terrain is open and swampy. Vegetation consists of hemlock along the valley walls, with aspen, pine, and dense willow along the creek.

The TAR was subject to pedestrian survey and was assessed to have generally low archaeological potential due to the steep slopes and avalanche hazards within the valley (Maps A and B in Appendix C). However, several microtopographic features were assessed to have archaeological potential, including flat, raised landforms and outlooks over Teigen Creek. Shovel testing was conducted at several locations along the TAR (Appendices B and C). No archaeological materials were identified. Two previously recorded archaeological sites were revisited: archaeological site HeTl-1 is a pre-1846 CMT site consisting of two bark stripped hemlock trees (see Section 5.1.1.11), and archaeological site HeTl-2 is a telegraph line cabin and trap tree located 40 m west of Highway 37 (see Section 5.1.1.12). Additionally, three historic blazed trees were identified during the survey of the TAR (Historic Feature B-5; Section 5.2.3).

4.1.1.3 Plant Site Spur Road

The proposed PSSR alignment travels south along the Teigen South Tributary, from the termination of the TAR at its junction with the TDPR to the process plant site, for a total of approximately 5 km (Figure 1-2 and Appendix C). The PSSR alignment passes through low-lying terrain adjacent to the creek, which is thickly vegetated with devil's club, hemlock, and cottonwood. The alignment then gains elevation and moves upslope into the subalpine. The PSSR was assessed by pedestrian survey and was determined to have low archaeological potential due to the steep valley slopes and generally poorly drained terrain within the valley (Appendix C). Shovel testing was conducted to confirm the low archaeological potential assessment and no archaeological materials were identified (Appendix B). Additional testing in this area was conducted as part of the TMF and process plant site assessments (described in Sections 4.2.1 and 4.2.2).

4.1.1.4 Transmission Line

The proposed transmission line alignment runs for approximately 12 km along the potential TAR and PSSR alignments (Figure 1-2 and Appendix C). However, the alignments diverge between Snowbank Creek and the potential switching station (Section 4.6). From the switching station, at its eastern

terminus, the terrain along the transmission line descends a moderate to steep slope west through hummocky terrain and dense slide alder to Snowbank Creek (Plate A-4 in Appendix A). West of Snowbank Creek a floodplain gives way to a series of undulating ridges that form the base of the mountains rising up to the northwest. After ascending the lowest of these ridges, the transmission line meets the TAR alignment. This section of the transmission line was assessed with pedestrian survey and shovel testing. No archaeological materials were identified.

4.1.1.5 Tunnel Divide Portals Spur Road

The TDPR alignment travels a total of approximately 17 km southwest along the narrow and steeply sloped Teigen West Tributary Valley, around West Teigen Lake, and up into the subalpine valley where the proposed Mitchell-Teigen Tunnel will daylight (Figure 1-2; Figures C-2, C-8, and C-9 in Appendix C). The subalpine valley between West Teigen Lake and the Mitchell-Teigen Tunnel varies from low-lying marshes to a rolling terrain with numerous meadows, marshes, ponds, and prominent knolls and ridges (Plates A-5 and A-6 in Appendix A). The southern end of the TDPR begins to slope down (south) to Treaty Creek, and the terrain opens up with large subalpine meadows flanked by hill and knolls.

The TDPR was assessed by pedestrian survey. The segment of the TDPR that runs along the Teigen West Tributary was assessed to have low archaeological potential due to the steep valley slopes. However, the southern portion of the TDPR within a subalpine valley contains numerous landforms assessed to have high archaeological potential. Eleven archaeological sites were identified along or in proximity to this segment of the TDPR (HdTm-1 to HdTm-11; Sections 5.1.2.2 to 5.1.2.12). A historic blazed tree (Historic Feature B-6; Section 5.2.3) and remnants of recent mineral exploration activity, located near Treaty Creek (Historic Features M-29 and M-34; Section 5.2.2), were also identified. One seasonal snow patch was observed just east of the TDPR alignment along its southern portion, approximately 1.25 km north of the mill site, within a subalpine valley in September 2011, and it was subject to pedestrian survey (see Section 4.4.2 for additional information regarding snow patches). No archaeological materials were observed in the snow patch.

4.1.1.6 Coulter Creek Access Road

The proposed CCAR alignment, totalling approximately 35 km, runs south from the existing Eskay Mine Access Road down Coulter Creek to the Unuk River, then east along Sulphurets Creek to Mitchell Creek (Figure 1-2 and Appendix C). Segments of the road alignment were assessed to have archaeological potential and were subject to pedestrian survey and shovel testing (Appendices B and C).

The segment between the Eskay Mine Access Road and Unuk River travels south through a high subalpine plateau east of Tom Mackay Lake and then follows the Coulter Creek drainage, descending south toward the Unuk River and Sulphurets Creek confluence (Figure 1-2 and Appendix C). The terrain east of Tom Mackay Lake is uneven and rocky, with numerous bedrock exposures (Plate A-7 in Appendix A). The terrain through the Coulter Creek drainage is rolling and sloped, with areas of dense hemlock and fir (Plate A-8 in Appendix A). The portions of the alignment in the subalpine east of Tom Mackay Lake and near the Unuk River were assessed as having archaeological potential. Large surface exposures were examined during the assessment near Tom Mackay Lake, and shovel testing was conducted where surface visibility was limited (Appendix B). No archaeological materials were identified. A number of historic mining features were identified along this segment, including historic blazed trees (Historic Features B-8 through B-10, B-13, B-22, and B-23; Section 5.2.3), six claim markers (Historic Features M-15, M-16, M-18 through M-20, and M-27; Section 5.2.2), five recent mining claim rock cairns (Historic Features M-2 through M-6; Section 5.2.2), core boxes, drill holes and associated debris (Historic Feature M-35), and one cabin (Historic Feature C-3; Section 5.2.2.1).

The road segment along Sulphurets Creek travels east from its confluence with the Unuk River and terminates at Mitchell Creek (Figure 1-2 and Appendix C). The Sulphurets Creek Valley is steeply sloped and rocky, with uneven and rolling hills (Plate A-9 in Appendix A and Figure 4.1-1). Vegetation consists of hemlock and fir along the valley sides and at the creek level. Sulphurets Creek Valley was assessed as having generally low archaeological potential due to the steep terrain near the western end and a general lack of well-drained, level topographic features along the creek. However, pedestrian survey and shovel tests were conducted near the confluence of the Unuk River and Sulphurets Creek and at the confluence of the Sulphurets and Mitchell creeks to confirm this assessment. No archaeological materials were identified. One historic cabin was identified and recorded near the mouth of Mitchell Creek (Historic Feature C-4; Section 5.2.2). Additional historic features in the area near the cabin include a claim marker (Historic Feature M-28) and a PVC drain pipe (Historic Feature M-30; Section 5.2.2).

South of the CCAR and southeast of the confluence of the Unuk River and Sulphurets Creek, previously recorded archaeological site HcTp-1 was revisited. This historic cabin site and its associated trap and target trees (Historic Features B-11 and B-12) are described in Sections 5.1.1.3 and 5.2.3.

4.1.1.7 Temporary Glacier Access Trail

The proposed Temporary Glacier Access Trail runs for a length of approximately 40 km and provides a winter access route over Frank Mackie Glacier from the confluence of Sulphurets and Ted Morris creeks, to the Tide Lake airstrip near the abandoned Granduc Mine (Figure 1-2 and Appendix C). This route would potentially be used during Project construction. The majority of the potential road alignment travels over glaciers and along frozen creek channels. Dr. Shea, who is an expert on glaciers in Western North America, examined the potential for archaeological materials in the Frank Mackie Glacier, and he has assessed the glacier as having very low archaeological potential (see Appendix E for additional information). Additionally, visual assessments were conducted along the proposed alignment in an effort to identify areas that may have archaeological potential; none were observed.

4.1.2 Assessments of Former Proposed Road Alignments

This section describes the assessments conducted on previously proposed road alignments that are no longer under consideration. The assessment of these alignments was not completed, and if any of these road options are reintroduced to the Project in the future, then additional archaeological work will be necessary. Note that the alignments for these former proposed road alignments are not on the maps in Appendix C; however, the areas that were assessed and tested are shown on the maps in Appendix C, and the shovel test locations are described in Appendix B.

4.1.2.1 Teigen Canyon Bypass Road Alignment (no longer under consideration)

The former proposed Teigen Canyon Bypass road alignment departed from the TDPR, east of the confluence of Teigen Creek and the Teigen West Tributary, and travelled northwest, upslope, around the north side of Hodkin Lake. The area is subalpine with rocky and uneven terrain, numerous marshes, and a moderately dense vegetation of stunted subalpine fir, grasses, and lichens (Plate A-10 in Appendix A). Pedestrian survey and shovel tests were conducted along the north side of Hodkin Lake, focusing on terraces, knolls, and other areas of level terrain adjacent to the lake (Appendix B and Appendix C). No archaeological materials were observed. Four historic blazed trees were identified on a peninsula along the north shore of the Hodkin Lake (Historic Features B-1 to B-4; Section 5.2.3).

4.1.2.2 Storie Creek Road Alignment (no longer under consideration)

The former proposed Storie Creek road alignment would have served as an access point to the former proposed McTagg and Mitchell haul tunnels; however, neither the road nor tunnels are currently under

consideration. The former proposed alignment would have started near the Unuk River and Storie Creek confluence and travelled northeast along the Storie Creek Valley, intersecting with the Teigen Canyon Bypass Road (no longer under consideration), and terminating at the TDPR. The vegetation along this alignment includes stunted fir and patchy undergrowth in subalpine areas and dense hemlock along the Storie Creek Valley (Plate A-11 in Appendix A). The alignment through the lower Storie Creek Valley was assessed to have generally low archaeological potential due to the steeply sloped and uneven terrain; however, the subalpine areas up the valley had landforms with archaeological potential. These areas were assessed by pedestrian survey and shovel tested prior to the route being deleted (Appendix C). No archaeological materials were observed. One claim block marker from 1989 was recorded (Historic Feature M-14; Section 5.2.2).

4.2 TAILING MANAGEMENT FACILITY AND PLANT SITES

This section describes the potential TMF and four process plant site options that were assessed during the AIA.

4.2.1 Tailing Management Facility

The TMF, which covers an area of approximately 13.8 km^2, is located in the valley near the divide between Teigen and Treaty creeks (Figure 1-2). The valley floor consists of a series of interconnected marshes, streams, and small ponds between the Teigen South Tributary and Treaty North Tributary and was assessed as having low archaeological potential due to the poorly drained, often saturated ground, and the lack of well-drained topographic features (Plate A-12 in Appendix A). This assessment was confirmed through a series of systematic pedestrian surveys during which no microtopographic features with archaeological potential were identified. The terrain along the valley walls is steeply sloped with numerous minor runoff drainages. A number of large rock exposures, terraces, and ridges are found in the subalpine zones on both sides of the TMF (Plate A-13 in Appendix A). These upper areas in and around the TMF were assessed by systematic pedestrian survey and shovel testing, which focused on series of prominent plateaus and ridges at the treeline. Pedestrian survey and shovel testing was also conducted at the south dam site (Appendices B and C). Archaeological site HdTl-1 was identified during shovel testing along the south valley wall (Section 5.1.2.1).

4.2.2 Process Plant Sites

At the time of the field assessment, four potential process plant sites were under consideration. The currently proposed Process Plant Site is located adjacent to the northwest edge of the TMF (Section 4.2.2.1). The three process plant sites that are no longer being considered are described in Sections 4.2.2.2 to 4.2.2.4.

4.2.2.1 Process Plant Site

The potential process plant site is located on a subalpine bench northwest of the TMF (Figure 1-2 and Appendix C). The terrain in this area is level, with numerous ridges aligned northwest to southeast located between marshes, small ponds, and minor drainages (Plate A-14 in Appendix A). Surficial deposits are primarily morainal within the process plant site area. Vegetation consists of patches of fir with alder understory. The assessment was conducted by systematic pedestrian survey, which covered the entire proposed process plant site and surrounding areas to the west and north (Appendix C). Shovel testing focused on microtopographic features; no archaeological materials were observed (Appendix B).

4.2.2.2 Process Plant Site 2A/2B (no longer under consideration)

Former proposed process plant sites 2A and 2B were located on either side of Kaypros Creek, but are no longer under consideration. Portions of these process plant site options were assessed during the TDPR alignment assessment, and the results are included in Section 4.1.1.5 and Appendix C. The assessment of the sites is not complete, and if either of these process plant options is reintroduced to the Project in the future, additional archaeological work will be necessary.

4.2.2.3 Process Plant Site 3 (no longer under consideration)

Former proposed process plant site 3 was located on a large subalpine plateau south of the Unuk River. Terrain in this area is characterized by uneven and rolling hills with numerous rock exposures and minor drainages and ponds (Plate A-15 in Appendix A). Vegetation is limited to patches of stunted fir and some undergrowth of alder, berry bushes, and juniper. A systematic pedestrian survey was conducted along several landforms that were assessed to have archaeological potential; these landforms were subject to shovel testing (Appendices B and C). No archaeological materials were observed. The assessment of process plant site 3 is not complete, and if this process plant option is reintroduced to the Project in the future, additional archaeological work will be necessary.

4.3 MINE PITS, ROCK STORAGE, AND OTHER ASSOCIATED FACILITIES

The Project includes three potential mine pits: Mitchell Pit and Iron Cap Pits, Sulphurets Pit, and Kerr Pit (Section 4.3.1 and Figure 1-2). Adjacent to these pits are three potential Rock Storage Facilities (RSFs). The McTagg Creek RSF (MTRSF) is located in the McTagg Creek Valley, the Mitchell RSF (MRSF) is along the south slope of Mitchell Creek Valley, and the Sulphurets RSF (SRSF) is located above Sulphurets Creek along its north slope (Section 4.3.2). Areas within the Gingras Creek Valley were assessed for a potential RSF; however, this option is no longer under consideration (Section 4.3.2.3). The terrain in each of the mine pit areas is generally steep, with rolling and rocky ground, numerous drainages and ponds, and patchy vegetation of stunted fir and shrubs. The potential RSFs contain areas with dense hemlock forest and alder and blueberry understory, with open marshy areas in valley bottoms, and steeply sloped, recently deglaciated terrain with minimal vegetation growth. Slope class mapping, generated from LiDAR data, was reviewed for the areas around the mine pits and RSFs to assist in the assessment of archaeological potential (Figure 4.3-1; Rescan 2010c). In addition, fisheries data were reviewed for the mine site area; all streams upstream of a cascade on Sulphurets Creek, situated approximately 300 m from its confluence with the Unuk River, have been classified as non-fish bearing due to the absence of fish beyond the cascade (Rescan 2010d).

4.3.1 Proposed Mine Pits

4.3.1.1 Mitchell Pit and Iron Cap Pit

The potential Mitchell Pit, including a northeast pit extension referred to as the Iron Cap Pit, is located on the north and south slopes of the Mitchell Creek Valley (Figure 1-2); it covers an area of approximately 9 km^2. The Mitchell Pit was assessed to have generally low potential due to steep slopes and recently deglaciated terrain (Figure 4.3-1). A wide, prominent bench that slopes westerly down the north wall of the Mitchell Creek Valley was the focus of pedestrian survey and shovel testing (Plate A-16 in Appendix A; Appendix B, and Appendix C). Two archaeological sites, HdTn-1 and HdTn-2, were recorded on small flat plateaus along this bench (Sections 5.1.2.13 and 5.1.2.14). The Iron Cap area is predominately covered in ice or is recently deglaciated exposed bedrock. The margins of glaciers and snow patches within the Iron Cap area were visually examined for exposed archaeological materials (see section 4.4.2 for additional information); however, none were identified.

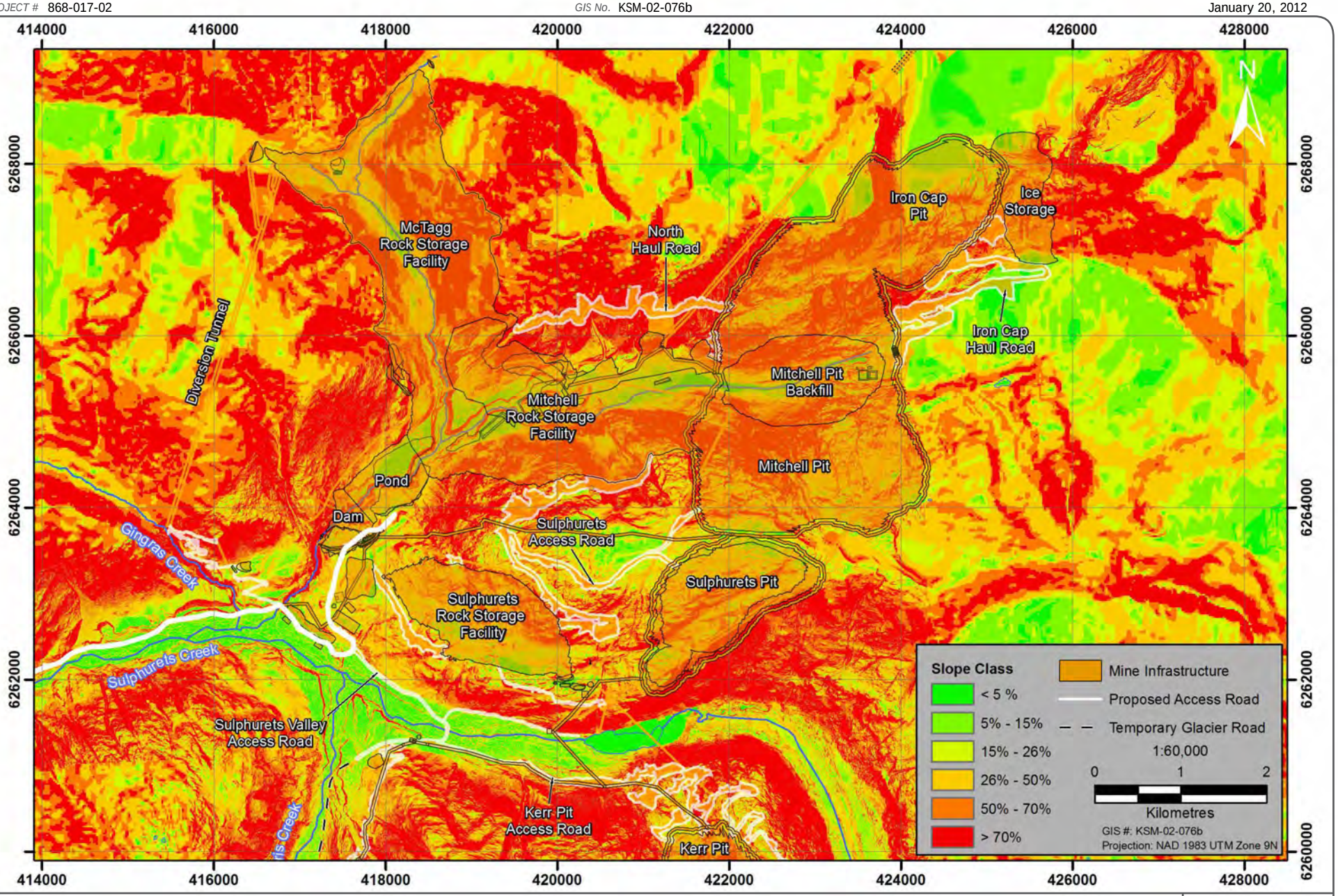

Figure 4.3-1

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Project Components and Associated Slope Classes

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Figure 4.3-1

4.3.1.2 Sulphurets Pit

The potential Sulphurets Pit is located in the alpine and subalpine on the north slope of the Sulphurets Creek Valley near its proglacial lake (Figure 1-2; Plate A-17 in Appendix A). It covers an area of approximately 1.8 km^2. Archaeological potential was generally assessed to be low due to steep slopes (Figure 4.3-1). Pedestrian survey and shovel testing focused on relatively level areas in the alpine and subalpine west of the Sulphurets Pit (Appendices B and C) and at drill pad sites assessed in 2010. In the alpine areas, extensive surface exposures were also examined. Additionally, snow/ice patches were examined when present. No archaeological materials were identified. Fourteen historic sites relating to mineral exploration in the area were identified during the survey, including five recent mining claim rock cairns (Historic Features M-7, M-8, and M-10 to M-12), two rock alignments with historic debris (M-9), three claim markers (M-17, M-21, and M-22), one area with historic debris (M-25), an old drill collar (M-26), a mineral sampling location (M-23), and a historic drill pad location (M-24; see Section 5.2.2 for additional information).

4.3.1.3 Kerr Pit

The potential Kerr Pit is located in the alpine and subalpine south of Sulphurets Creek and is largely exposed bedrock (Figure 1-2 and Appendix C). It covers an area of approximately 1.9 km^2. Archaeological potential of the Kerr Pit was generally assessed to be low due to the rugged terrain and steep slopes (Figure 4.3-1). In the areas assessed to have archaeological potential during in-field visual assessment, pedestrian survey focused on the examination of the bedrock exposures present in the area (Appendix C). In areas with archaeological potential that had soil development, shovel testing was also conducted (Plate A-18 in Appendix A; Appendix B). In addition, when present, snow/ice patches were examined. No archaeological materials were located, but one historic rock alignment (M-13; Section 5.2.2) related to mineral exploration was recorded.

4.3.2 Rock Storage Facilities

4.3.2.1 McTagg and Mitchell Rock Storage Facilities

The potential MTRSF and MRSF are located around the confluence of the Mitchell and McTagg creeks and up both creek valleys (Figure 1-2 and Appendix C). They cover an area of approximately 8.5 km^2. The valleys are steep sided (Figure 4.3-1) and in some areas only very recently deglaciated; both the MTRSF and MRSFs were assessed to have low potential. Both were subject to in-field visual assessment in an effort to identify micro-topographic landforms that may have archaeological potential and to confirm the overall assessment of low potential. The area near the confluence of the Mitchell and McTagg creeks was assessed to have archaeological potential and was subject to pedestrian survey and shovel testing (Appendices B and C). No archaeological materials were recovered. An historic prospecting camp (Historic Feature C-5; Section 5.2.2) and an historic blazed tree with an axe-cut limb (B-14; Section 5.2.3) were located in the MTRSF area. The margins of the glaciers at the western and northern ends of the MTRSF area were visually assessed and found to be very steep and treacherous, with no archaeological potential. The margin of the glacier within the MRSF was subject to pedestrian survey and inspection (see Section 4.4.2 for additional information). No archaeological materials were recovered.

4.3.2.2 Sulphurets Rock Storage Facility

The potential SRSF is located west of the Sulphurets Pit on the slopes above Sulphurets Creek (Figure 1-2 and Appendix C). It covers an area of approximately 1.8 km^2. Generally, the area was assessed as having low archaeological potential due to the steep terrain (Figure 4.3-1). Some areas within the SRSF were assessed via in-field visual assessment, while other areas were subject to pedestrian survey and shovel tests to confirm the assessment of low potential (Appendices B and C). At the highest elevation of the SRSF several small snow/ice patches were observed and examined. No archaeological materials were identified in the SRSF.

4.3.2.3 Gingras Creek Rock Storage Facility (no longer under consideration)

The Gingras Creek RSF is a former proposed development component that is no longer under consideration. It would have been located within the Gingras Creek Valley, which runs southeast from a glacier at the east flank of John Peaks to its confluence with Mitchell Creek. The area was assessed as having generally low archaeological potential due to steep terrain (Figure 4.1-1). The pedestrian survey focused on the margin of the glacier at the western end of the valley, along the subalpine ridgeline immediately southwest of the valley, and areas on both sides of the confluence of Gingras and Mitchell creeks (Plate A-19 in Appendix A; Appendix B, and Appendix C). Shovel testing focused on subalpine knolls and plateaus and areas near the Gingras-Mitchell creek confluence. One archaeological site (HdTo-5) was recorded in a subalpine area southwest of Gingras Creek (Section 5.1.2.19).

4.3.3 Explosives Magazine and Manufacturing Facilities

The proposed explosives magazine is located to the southeast of the confluence of the Sulphurets and Ted Morris creeks (Appendix C). The terrain is moderate to steeply sloped and generally poorly drained (Plate A-20 in Appendix A). Vegetation consists of hemlock and spruce over devil's club and dense stands of alder. The area was assessed by pedestrian survey and was determined to have generally low archaeological potential. Shovel testing was conducted on four ridges in the area, and no archaeological materials were identified during the assessment.

The potential explosives manufacturing facility is located south of the explosives magazine (Appendix C). The terrain is steeply sloped and poorly drained, with dense alder and underbrush. The explosives manufacturing facility was assessed by pedestrian survey and determined to have low archaeological potential. No archaeological materials were identified.

4.3.4 Truck Shop

The proposed Truck Shop is located to the east of the Mitchell and Sulphurets creeks confluence and northeast of Construction Camp 9 (Appendix C). The terrain is rugged and variably sloped, ranging from small level areas to steep slopes (Plate A-21 in Appendix A). The area is generally poorly drained; there are numerous seasonal drainages throughout the area. The vegetation consists of a hemlock and spruce canopy, with patches of alder, and an understory of moss, blueberry, and devil's club. The truck shop was systematically assessed by pedestrian survey. Overall, the area was determined to have low archaeological potential due to strong slope and poor drainage. However, four well-defined rises were identified as having potential, and they were subject to shovel testing. No archaeological materials were identified during the assessment of the truck shop.

4.4 ALPINE AND SUBALPINE AREAS

The assessment of alpine and subalpine areas, areas along the margins of receding glaciers, as well as snow/ice patches within the study area and in proximity to the Project footprint are described below. While some of these areas are not within the currently proposed development area, they were selected for survey due to their proximity to potential exploration activities. Currently no project developments are anticipated in these areas.

4.4.1 John Peaks

An alpine and subalpine area on the west flank of John Peaks, assessed to contain areas of high archaeological potential, was subject to pedestrian survey (Appendices B and C). The terrain in this area consists of rolling rocky hills and ridges with small marshes, small drainages, and ponds. Vegetation is typically sparse and mainly consists of small patches of stunted fir. In several areas, excellent subsurface exposures were available for examination. Pedestrian survey and shovel testing focused on microtopographic features, and four archaeological sites (HdTo-1 to HdTo-4) were identified (Sections 5.1.2.15 to 5.1.2.18). No Project components are currently proposed in this area.

4.4.2 Glacial Valleys/ Snow and Ice Patches

The Project is situated in a rugged and mountainous area of northwest British Columbia, where the highest elevations are largely covered by glaciers and ice patches. Since the end of the Little Ice Age, 100 to 250 years ago, these ice and snow features have substantially receded and are projected to continue to recede exposing newly deglaciated land. For example, the glacier at the head of Mitchell Creek has receded approximately 1 km since 1982. Over the past 20 years, archaeologists have increasingly investigated human use of high elevation areas and the snow and ice features that are sometimes present in these areas. A number of important discoveries, including well-preserved organic material culture and human remains, have been made in North America (Beattie et al. 2000; Farnell et al.; 2004, Hare et al., 2004; Dixon, Manley, and Lee 2005; University of Colorado 2010).

In assessing the potential for archaeological remains in a snow or ice feature within the Project area, a key distinction between ice patches and glaciers must be made. Ice patches are "perennial snow features that persist for greater than two consecutive years, and they consist of snow and firm (multi-year snow) in their upper layers, and ice in their deeper layers," whereas glaciers are "perennial snow and ice features that persist for greater than two years, and where mass is transferred between accumulation areas and ablation (melt) areas through sliding, ice deformation, or bed deformation" (J. M. Shea, pers. comm.; Appendix E). Large portions of the Project area are characterized by the latter: large glaciers undergoing dynamic processes that "are highly erosive and destructive" (Appendix E). Preserved archaeological remains are unlikely to be found on the surface or forefield of a glacier. The rare cases of such finds, are the result of a series of fortuitous circumstances that protected the materials from the destructive forces of the glacier. To address this remote possibility, valleys associated with receding glaciers, including Knipple Glacier, were surveyed, with a focus on examining the receding ice and ice patches for exposed archaeological material. The margins of the receding glaciers and snow patches were subject to pedestrian survey in six valleys: the Gingras, Sulphurets, Mitchell, and Tim Williams Creek valleys, and two unnamed tributaries of Treaty Creek. The terrain in all of these valleys is rocky and uneven, consisting of exposed rock or morainal material or patchy vegetation of small shrubs or grasses (Plates A-22 and A-23 in Appendix A). An extensive examination of these areas did not identify any archaeological materials.

4.5 EXPLORATION AND CONSTRUCTION CAMPS

Twelve potential camp locations were assessed during the AIA, including one exploration camp and eleven construction camps. A summary of the AIA results are provided in this section. For more detailed information about the locations of these camps and the shovel tests conducted, please refer to Appendices B and C.

4.5.1 Seabee Exploration Camp

The Seabee Exploration Camp is located at the south side of the confluence of the Teigen and South Teigen creeks (Plate A-24 in Appendix A; Appendix C). The area is low lying, with dense vegetation of devil's club and pine trees. The camp area was subject to pedestrian survey and shovel testing, and the creek bed and cutbank exposures were examined for archaeological material; no materials were identified. A historic cabin site and trap trees (Historic Feature C-1; Section 5.2.1.1) were recorded immediately adjacent to the Seabee Exploration Camp area. No archaeological materials were identified.

4.5.2 Construction Camp 1

The proposed Construction Camp 1 is located to the east of the Bowser River, northwest of Granduc Mine and the receding Knipple Glacier, and north of Summit Lake. The terrain is a level plain of glacial till and alluvial deposits with little soil development, and a portion of the footprint is within the river channel (Plate A-25 in Appendix A). Vegetation is sparse and consists of stands of willow, grasses, and

isolated hemlock. The area was determined to have low archaeological potential, and the assessment was confirmed by systematic pedestrian survey with no suitable areas identified for shovel testing. No archaeological materials were identified during the assessment.

4.5.3 Construction Camp 2

The proposed Construction Camp 2 is located on a terrace to the south of Sulphurets Creek, and to the west of KSM Exploration Camp (Plate A-26 in Appendix A; Appendix C). The terrain is variably sloping and generally poorly drained. Vegetation consists of hemlock, spruce, alder, devil's club, and blueberry. The area was considered to have archaeological potential. The area was assessed by systematic pedestrian survey, and shovel testing was conducted. No archaeological materials were identified.

4.5.4 Construction Camp 3

The proposed Construction Camp 3 is located to the west of the Eskay Creek Mine Road, at 54 km, and northeast of Tom Mackay Lake (Plate A-27 in Appendix A; Appendix C). A series of long, subalpine ridges run through the area above Tom Mackay Creek and a large marsh. As currently proposed, the northwest half of the camp is located in the creek and marsh. Vegetation consists of subalpine fir, hemlock, and juniper, with heather and grasses on the ridges and willow in the marsh. The footprint was assessed by systematic pedestrian survey, and areas of archaeological potential were identified along the ridges, where shovel testing was conducted. One archaeological site, HdTo-6, was identified at the top of a ridge overlooking Tom Mackay Creek and the marsh (Section 5.1.2.20).

4.5.5 Construction Camp 4

The proposed Construction Camp 4 is located north of Mitchell Creek on the rugged, variably sloped terrain of an old rock slide (Plate A-28 in Appendix A; Appendix C). Vegetation consists of subalpine fir, dense alder, and devil's club growing around several drainages that run through the camp footprint. The area was assessed by systematic pedestrian survey. No suitable areas were identified for shovel testing, and no archaeological materials were identified.

4.5.6 Construction Camp 5

The proposed Construction Camp 5 is located to the west of Snowbank Creek and immediately west of Highway 37 (Appendix C). The camp footprint was found to be in a large marshy area and lake. The area was visually assessed and determined not to have archaeological potential.

4.5.7 Construction Camp 6

The proposed Construction Camp 6 is located to the west of South Teigen Creek on rolling and rocky terrain (Plate A-29 in Appendix A; Appendix C). A series of north-south trending, subalpine ridges run through the area and were identified as having archaeological potential. Between these ridges, the terrain is sloped and poorly drained. Vegetation consists of subalpine fir and spruce with an understory of juniper and moss. Construction Camp 6 was assessed by systematic pedestrian survey and shovel testing. No archaeological material was observed.

4.5.8 Construction Camp 7

The proposed Construction Camp 7 is located north of Treaty Creek (Plate A-30 in Appendix A; Appendix C). The terrain is rugged and rocky with very little soil formation. The vegetation consists of stands of subalpine fir and alder between large expanses of exposed bedrock. The area was assessed by pedestrian survey and considered to have low archaeological potential. No suitable areas for shovel testing were identified, and no archaeological materials were identified during the assessment.

4.5.9 Construction Camp 8

The proposed Construction Camp 8 is located on the western bank of the Unuk River, north of the confluence with the Sulphurets Creek (Appendix C). The terrain is variable and ranges from relatively level to strongly sloping. The northern half of the footprint is on a recent floodplain, while the southern half is on a steep slope (Plate A-31 in Appendix A). The vegetation consists of a hemlock and black spruce, with an understory of devil's club, blueberry, and moss. The area was visually assessed and determined to have low archaeological potential.

4.5.10 Construction Camp 9

The proposed Construction Camp 9 is located to the north of Sulphurets Creek, near the confluence with Mitchell Creek (Plates A-32 and A-33 in Appendix A; Appendix C). The camp footprint is divided into three sections in close proximity to each other. The terrain is variably sloped and densely forested with a canopy of mature hemlock, interspersed with spruce, and an understory of blueberry, devil's club, and moss. The area was assessed by systematic pedestrian survey, and shovel testing was conducted. No archaeological materials were identified.

4.5.11 Construction Camp 10

The proposed Construction Camp 10 is north-northwest of the existing KSM Exploration Camp on the western bank of a tributary of Mitchell Creek (Appendix C). The terrain is a rugged, moderately-sloped rock slide devoid of vegetation. The area lacks any topographic features demonstrating archaeological potential. The camp was visually assessed and determined to have no archaeological potential due to the rugged and steep terrain and its recently deglaciated location.

4.5.12 Construction Camp 11

The proposed Construction Camp 11 is located on the eastern bank of the Unuk River, north of its confluence with Sulphurets Creek (Plate A-34 in Appendix A; Appendix C). The terrain is gently sloped and poorly drained, with marshes and small stream channels, between rugged, steep ridges. The area was systematically assessed by pedestrian survey, and shovel testing was conducted on topographic features with archaeological potential. No archaeological materials were identified.

4.6 SWITCHING STATION

The switching station is located east of Snowbank Creek on poorly drained variable slope with east-west trending rocky ridges and knolls that run perpendicular to the slope (Plate A-35 in Appendix A; Appendix C). The centre line of British Columbia Hydro's Northwest Transmission Line runs through the switching station. The vegetation is dominated by spruce and hemlock over blueberry, devil's club, and saplings. Large patches of alder are also found throughout the area. Pedestrian survey and shovel testing was conducted. No archaeological materials were observed.

4.7 FISH HABITAT COMPENSATION AREAS

During the 2011 field season seven potential fish habitat compensation areas were subject to AIAs. These sites, discussed below, are all located in close proximity to existing creek channels. No additional archaeological sites were located during the assessment. There are three previously recorded archaeological sites located in close proximity to the Oweegee Creek Fish Habitat Compensation Area: HdTk-1, HdTk-2, and HeTk-1 (Sections 5.1.1.5, 5.1.1.6, and 5.1.1.8). For location maps of these areas and associated shovel testing information, please refer to Appendices B and C.

4.7.1 Taft Creek Fish Habitat Compensation Area

The potential Taft Creek Fish Habitat Compensation Area is located on the east side of Taft Creek between its confluence with the Bell-Irving River and Highway 37 (Appendix C); it covers an area of approximately 259,000 m^2. The development is in a low floodplain populated with relic creek channels and is overlooked by earlier floodplain terraces terminating in cutbanks (Plates A-36 and A-37 in Appendix A). The vegetation consists of spruce, fir, and cottonwood over devil's club and ferns with large alder patches. Much of the area inspected during the AIA was assessed as having low archaeological potential. Shovel testing was conducted to confirm the assessment. No archaeological materials were observed.

4.7.2 Glacier Creek Fish Habitat Compensation Area

The potential Glacier Creek Fish Habitat Compensation Area is located on the east side of Glacier Creek and extends north for approximately 2 km from its confluence with the Bell-Irving River (Plate A-38 in Appendix A; Appendix C). The terrain is low lying, hummocky, and uneven, with numerous active braided creek channels overlooked by a higher terrace that terminates in a cut bank. The vegetation consists of spruce, poplar, and cottonwood, with an understory of devil's club, ferns, and berry bushes with patches of alder. Much of the area inspected during the AIA was assessed as having low archaeological potential. Subsurface testing was conducted to confirm the assessment. No archaeological materials were observed.

4.7.3 Treaty Creek Fish Habitat Compensation Area

The potential Treaty Creek Fish Habitat Compensation Area is located on a floodplain on the north side of Treaty Creek (Appendix C). The area is low and wet with numerous braided channels (Plates A-39 and A-40 in Appendix A). Beaver dams have flooded much of the northern portion of the potential development. The vegetation consists of poplar and fir with an understory of devil's club and ferns with patches of alder. This area was assessed to have low archaeological potential. Some subsurface testing was conducted in areas of low archaeological potential to confirm the assessment, and no archaeological materials were recovered.

4.7.4 Teigen Creek Fish Habitat Compensation Area

The potential Teigen Creek Fish Habitat Compensation Area is located on a floodplain on the north side of Teigen Creek (Appendix C). The area is low and wet with numerous relic stream channels. The vegetation is cottonwood and fir over devil's club and berry bushes interspersed with alder patches. The area was assessed to have low potential for archaeological sites and no landforms were located that required shovel testing. No archaeological materials were observed.

4.7.5 Snowbank Creek Fish Habitat Compensation Area

The potential Snowbank Creek Fish Habitat Compensation Area is located on a flood plain formed by Snowbank Creek (Appendix C). The banks are 1 to 2 m above the creek and are generally level, with little to no soil development (Plate A-41 in Appendix A). The forest is dominated by spruce, poplar, and cottonwood over an understorey of devil's club and blueberry. Subsurface testing was conducted on higher raised terraces that were formed by relic creek channels. These areas were considered to have low to moderate potential for the presence archaeological materials. No archaeological materials were observed.

4.7.6 Oweegee Creek Fish Habitat Compensation Area

The potential Oweegee Creek Fish Habitat Compensation Area begins at the confluence of the Bell-Irving River and Oweegee Creek and runs north along Oweegee Creek through a low floodplain (Appendix C). The floodplain is a wide level area filled with relic oxbows and braided stream channels

bordered by steep sided creek terraces that rise 5 to 10 m above the creek channel (Plate A-42 in Appendix A). The terrace above the floodplain is outside of the potential development footprint. Vegetation in the floodplain consists of hemlock, cottonwood, willow, and spruce, with an understory of devil's club. Three archaeological sites are located in close proximity to the Oweegee Creek Fish Habitat Compensation Area: HdTk-1, HdTk-2, and HeTk-1. HdTk-1 is a historic habitation site with a potential pre-contact component and a possible burial; HdTk-2 is a historic burial; and HeTk-1 is a pre-contact lithic scatter (Sections 5.1.1.5, 5.1.1.6, and 5.1.1.8). Shovel testing was conducted in areas of potential. No archaeological materials were observed.

4.7.7 Todedada Creek Fish Habitat Compensation Area

The potential Todedada Creek Fish Habitat Compensation Area is located in the Todedada Creek Valley north of Todedada Lake (Map F in Appendix C) and covers an area of approximately 485,000 m^2. The development footprint runs along the Todedada Creek floodplain and marsh, which is bordered by a slope that rises to the east (Plate A-43 in Appendix A). Vegetation in the floodplain consists of sedges, grasses, and some patches of willow, while the vegetation on the slope overlooking the valley consists of fir, hemlock, and alder, with an understory of blueberry, grasses, devil's club, and ferns. The floodplain and marsh were assessed to have low archaeological potential. Subsurface testing was conducted on level micro-topographic features on the slope to the east of the marsh in areas of low to moderate archaeological potential. No archaeological materials were recovered.

5. Identified Heritage Concerns

There are 34 archaeological sites within the study area, including 20 archaeological sites recorded during this AIA and 14 previously recorded archaeological sites (Section 5.1; Figure 5-1). In addition, a number of historic and recent land use features were identified during the field assessment (Section 5.2; Figure 5-2).

5.1 ARCHAEOLOGICAL SITES

All archaeological sites within the study area are discussed below. Sites recorded under other permits are presented in Section 5.1.1, and photos, if available, are presented in Appendix D-1. For maps of previously recorded sites, please consult the associated permit report and/or site form referenced below and available from the Archaeology Branch. Site maps, photos, and artifact catalogues for the 20 archaeological sites recorded during this AIA are located in Appendix D-2.

5.1.1 Previously Recorded Sites

5.1.1.1 HcTj-1

Archaeological site HcTj-1 is an historic burial site located on the north shore of Bowser Lake. The site consists of at least two burials, Simon Gunanoot and his father Johnson Nah-Gun, as well as a cabin that may predate the burials. At one time, a picket fence may have marked the burials, but by the 1980s the fence was no longer standing and the forest had largely reclaimed the site (McLeod and McNeil 2004; Marshall, Marr, and Palmer 2008). This site was not revisited as it is located over 9 km from any proposed development.

5.1.1.2 HcTn-1

HcTn-1 is a single artifact find (obsidian flake) from a surface exposure at the edge of a terrace (Walker and McKnight 2011). The site is located in the subalpine at 1,376 masl, approximately 1.4 km west of Brucejack Lake (Figure 5-1). Fifty-six shovel tests on the landform were negative, and extensive surface exposures were examined; however, no additional archaeological material was identified. The site is interpreted as a temporary camp site where retooling took place.

5.1.1.3 HcTp-1

Historic archaeological site HcTp-1, located on the east bank of the Unuk River, south of its confluence with Sulphurets Creek, was revisited in 2009 (Figure 5-1). The site consists of two trapping cabins, a trap tree, a rack for hanging small game, and old metal traps. The first log cabin, which was noted in the 1935 Minister of Mines report (BC DOM 1936), was recorded as a site in 1990 (Brolly 1990). This cabin was constructed with notched and peeled logs and a shake roof. In 1990, the original cabin was still standing, but it has since collapsed (Appendix D-1). A new log cabin, also constructed of notched and peeled logs with a plywood and metal sheeting roof, has been built adjacent to the collapsed cabin. As neither of the cabins predates 1846, site HcTp-1 is not protected by the HCA.

5.1.1.4 HdTj-1 (Treaty Creek Site)

Archaeological site HdTj-1 was listed as a Provincial Heritage Site as part of the Nisg̲a'a Final Agreement (1999). It is a historically significant battle site and the location of a subsequent peace treaty resulting in the establishment of territorial boundaries between the Nisg̲a'a and Tahltan.

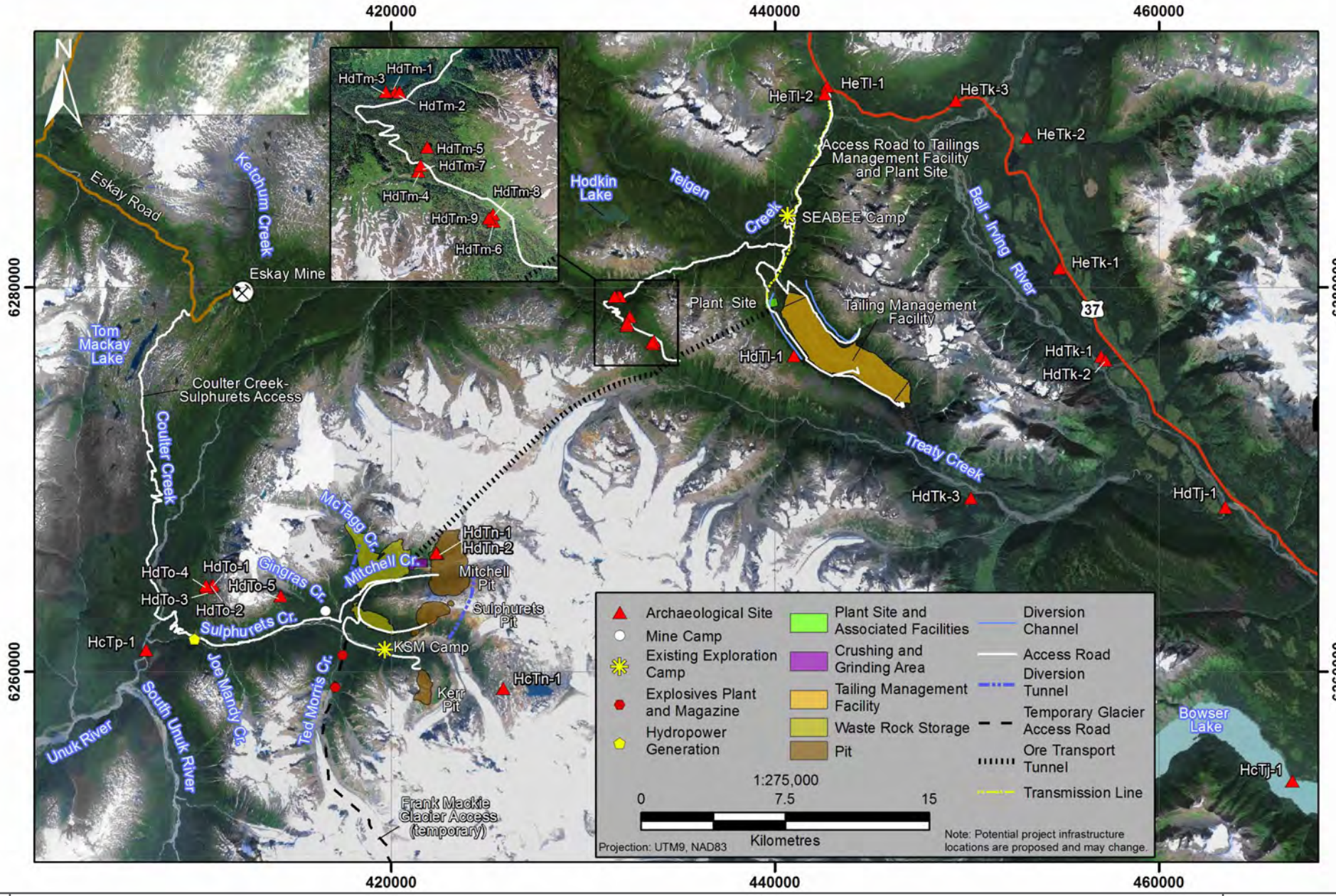

Figure 5-1

SEABRIDGE GOLD
KSM PROJECT

Identified Archaeological Sites

Figure 5-1

Rescan
Engineers & Scientists

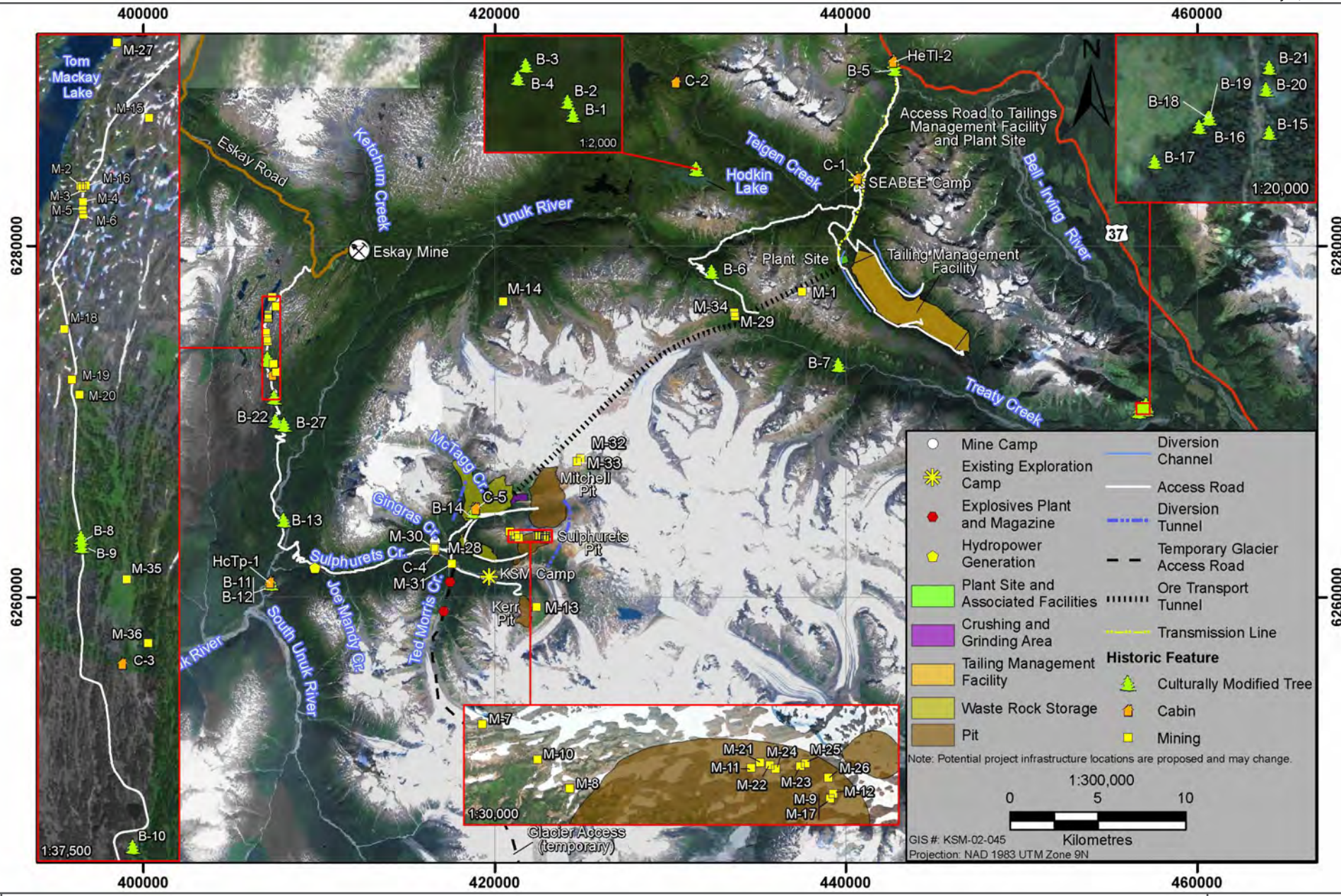

Figure 5-2

SEABRIDGE GOLD
KSM PROJECT

Historic and Recent Land Use Features Observed During The Study

Figure 5-2

Rescan
Engineers & Scientists

The site is located 24 km south of Bell 2 Lodge, on the southern side of the confluence of the Bell-Irving River and Treaty Creek (Figure 5-1). The site area has a canopy of cottonwood, willow, alder, and hemlock, with a heavy understory of devil's club and is 1 to 2 m above the current level of the Bell-Irving River. A rock cairn was reportedly built on a nearby hillside to mark this location (School District 87 n.d.). The site was revisited in 2008, and the cairn could not be located.

5.1.1.5 HdTk-1

Archaeological site HdTk-1 is a historic site with a potential prehistoric component located in a meadow and in the forest surrounding it on the east bank of Oweegee Creek. The site is approximately 100 m by 100 m and includes a house pit/cabin site, hand-hewn wooden planks, historic habitation debris surrounding a tree, 12 CMTs, and a culturally altered sandstone rock that may mark a burial. The site was occupied from 1875 to the 1940s by at least five Skawill families (Hrychuck, Zoffman, and Butte 2008). Vegetation in the area includes pine, fir, spruce, and cottonwood, with an understorey of blueberry, devil's club, ferns, and mosses.

5.1.1.6 HdTk-2

Archaeological site HdTk-2, also known as the Tyee site and Adiiam site, is an historic habitation site with one, possibly two, unmarked graves. The site is approximately 42 m by 32 m. The first grave contains a male from Hagwilget who fell from cut timbers and was critically injured. He was buried at the site of the accident. An infant may also be buried in the area (Hrychuck, Zoffman, and Butte 2008).

5.1.1.7 HdTk-3

Archaeological site HdTk-3 is subsurface lithic scatter measuring approximately 10 m by 10 m. It is located on the northern shore of Gilbert Lake, south of Treaty Creek (Figure 5-1). Vegetation in the area includes hemlock, fir, and berry bushes. The site was originally recorded in 2006 (Marshall, Marr, and Palmer 2008) when a single obsidian flake was recovered from one positive shovel test. The site appeared to be in good condition during the site revisit. No additional archaeological materials were identified.

5.1.1.8 HeTk-1

Archaeological site HeTk-1 is a surface and subsurface lithic scatter located on a north-south trending knoll to the west of Oweegee Creek in the ground disturbance left by a skidder trail. Site boundaries measure 20 m by 20 m. Lithics recovered from the site include obsidian debitage, some with cortex (Pegg and Dodd 2007). This site was not revisited during this AIA.

5.1.1.9 HeTk-2

Archaeological site HeTk-2 is a prehistoric lithic scatter located on a terrace approximately 20 m south of Hodder Creek. The area is characterized by mature open forest and relatively level and well drained ground. The site boundaries measure 10 m (north to south) by 25 m (east to west). The site was identified in 2007 during work conducted under Heritage Inspection Permits 2007-0200 and 2007-0258 and was not revisited during this AIA. Fifty shovel tests were conducted, and tree throws in the area were examined. Two andesite flakes were recovered from two shovel tests.

5.1.1.10 HeTk-3 (Bell-Irving Telegraph Cabin)

Historical archaeological site HeTk-3 is a historical site consisting of a Dominion Yukon Telegraph Line cabin, a segment of telegraph wire, and an associated CMT. The site is located on a terrace 100 m north of Highway 37 and 20 m east of a small unnamed creek. Site boundaries measure 30 m (northeast to southwest) by 20 m (northwest to southeast). The cabin is currently in poor condition as the roof has

collapsed. The site was recorded in 2009 during work conducted under Heritage Inspection Permits 2007-0200 and 2007-0258 (the site form is on file with the Archaeology Branch).

5.1.1.11 HeTl-1

Archaeological site HeTl-1 is a CMT site located in the Snowbank Creek Valley, approximately 200 m south of Snowbank Creek and 750 m west of Highway 37 (Figure 5-1). The site measures 20 m by 15 m and consists of two bark-stripped hemlock CMTs, which are dated to, at minimum, 1838 and 1858 AD (Appendix D-1; Marshall, Marr, and Palmer 2008).

5.1.1.12 HeTl-2 (Snowbank Creek Telegraph Cabin)

Historical archaeological site HeTl-2 is an old Dominion Yukon Telegraph Line cabin with an associated outbuilding and recent blazed and notched trees. The site is located 40 m west of Highway 37 near Snowbank Creek. The site boundaries measure 25 m (north to south) by 50 m (east to west). The structures are in a clearing, located south of a large wetland area, and are surrounded by cottonwood and subalpine fir. The main cabin measures 5 m (east to west) by 11 m (north to south) with its door on the north side (Appendix D-1). This structure includes an original 5 m by 5 m cabin and a later 6 m addition to its north side. The outbuilding is likely a shed and measures 5 m by 5 m, with a door on the east side. It is located 5 m west of the cabin. Two notched trees and a stump cut into a post are located approximately 20 m east of the cabin. The cabin has likely been used as a trapper's cabin after the telegraph line was abandoned in the 1930s (Newman 1995; Miller 2004). The site was recorded in 2009 during work conducted under Heritage Inspection Permits 2007-0200 and 2007-0258 (the site form on file with the Archaeology Branch).

The Dominion Yukon Telegraph Line was built between 1900 and 1901 and ran along the north side of the Bell-Irving River Valley, then north up Snowbank and Beaverpond creeks (see Figure 2.8-1). In 2010, the telegraph line was listed on the Regional District of Kitimat-Stikine's Community Heritage Register. Features associated with the telegraph line (e.g., telegraph wire, insulators, poles, maintenance cabins, and pack trail) are generally in poor condition, and the line itself has largely fallen to the ground. The section of telegraph line near Snowbank Creek frequently needed to be rebuilt during its lifetime due to avalanches, snowfall, and fallen trees, and it has been largely unmaintained since the 1930s (Miller 2004).

5.1.1.13 HfTm-2

Archaeological site HfTm-2 is a subsurface lithic scatter located on a knoll overlooking Beaverpond Creek to the southeast. The site measures 10 m (northwest to southeast) by 6 m (northeast to southwest) and contains five obsidian flakes. It was identified in 2010 during work conducted under Heritage Inspection Permits 2007-0200 and 2007-0258. The site is above a cutbank immediately west of Highway 37; it is likely that a portion of the landform was destroyed during construction of the highway.

5.1.1.14 HfTm-3

Archaeological site HfTm-3 is a subsurface lithic scatter located on a raised landform at the toe of a slope. The site measures 4 m by 4 m and contains a single obsidian flake and a post-1846 kindled hemlock CMT. The site was recorded in 2011 during work conducted under Heritage Inspection Permits 2007-0200 and 2007-0258. The construction of Highway 37 may have destroyed the eastern portion of the landform and site.

5.1.2 Newly Archaeological Sites Recorded

5.1.2.1 HdTl-1

Archaeological site HdTl-1 is a subsurface lithic scatter (Table D.2-1 in Appendix D-2). The site is situated on a small bench on the northeast face of the mountain that divides the upper portion of Treaty Creek from the north arm of Treaty Creek at approximately 1,220 masl (Figure 5-1). The site measures 15 m by 15 m and is covered in dense subalpine fir. It is situated directly north of a marsh and is just down slope from the treeline, which generally follows the 1,240 masl contour on the north face of this mountain (Plate D.2-1 in Appendix D-2). Fifty-one shovel tests were conducted along the bench, resulting in two positive tests (Appendix B, Test Location 107). Two obsidian flakes were recovered; however, no diagnostic artifacts were found.

The average stratigraphy of the site consists of 5 cm of litter mat, 4 cm of light grey sandy silt with roots, followed by 11 cm of reddish brown sandy silt with organics or rocks/pebbles. Testing was conducted to the "C" horizon, a layer that was composed of rocks, cobbles, and pebbles, at approximately 20 cm depth below the surface (DBS). Artifacts were recovered just below the litter mat.

The site is interpreted as a temporary campsite and/or retooling area. Its location just below the treeline provides shelter and easy access to firewood, as well as game like marmots and mountain goats in the subalpine meadows upslope of the site. One obsidian artifact from HdTl-1 was sent for XRF analysis and was sourced to Mount Edziza flow no. 3, located approximately 110 km northwest of the site.

5.1.2.2 HdTm-1

Archaeological site HdTm-1 is a subsurface lithic scatter (Figure 5-1; Table D.2-2 in Appendix D). The site measures 35 m (north to south) by 16 m (east to west) and encompasses a portion of a northeast-southwest trending ridge that overlooks a marsh to the southeast and West Teigen Lake to the northwest. The site area is relatively level and is roughly 3 m above the present water level of the lake. The area has a canopy dominated by hemlock and an understory of blueberry bushes (Plate D.2-2 in Appendix D-2).

Thirty-four shovel tests were conducted along the ridge (Appendix D). Nineteen obsidian flakes, two vitric tuff flakes, and one utilized obsidian flake were recovered from the five positive tests (Appendix B, Test Location 34). No diagnostic artifacts were found. The average stratigraphy of the site consists of 5 cm of litter mat, followed by 10 cm of grey silty sand with roots and pebbles, which is followed by 10 cm of brown silty sand with cobbles. Testing was conducted to the "C" horizon. Artifacts were recovered between 5 and 15 cm DBS, in the grey silty sand layer.

Based on the site's favourable location on West Teigen Lake and materials found, it is interpreted as a temporary campsite. The depression recorded at the HdTm-1 site is similar in size to ethnographically described cache pits, which were often located near camps (Albright 1984). One obsidian artifact from HdTm-1 was sent for XRF analysis and was sourced to Mount Edziza flow no. 3, located approximately 105 km northwest of the site.

5.1.2.3 HdTm-2

Archaeological site HdTm-2 is a small (30 m north to south by 30 m east to west) subsurface lithic scatter (Figure 5-1; Figure D.2-3 in Appendix D-2). Site HdTm-2 measures 30 m (north to south) by 30 m (east to west) and is situated approximately 70 m east of, and 7 m above, site HdTm-1 Plate D.2-2 in Appendix D-2). Both sites are located on the same ridge, which overlooks a marsh to the southwest and West Teigen Lake to the north. The site area has a canopy of fir and an understory dominated by blueberry bushes.

Twenty-seven shovel tests were conducted (Appendix B, Test Location 35). Two obsidian flakes were identified from two shovel tests. No diagnostic artifacts were found. The average stratigraphy of the site consists of 2 cm of litter mat, followed by 3 cm of light grey sandy clay, followed by 10 cm of dark reddish brown sandy loam with rounded cobbles and gravels. Testing was conducted to the "C" horizon. Artifacts were recovered just below the litter mat.

Site HdTm-2 is interpreted as a temporary campsite and/or hunting location. One artifact from HdTm-2 was sent for XRF analysis and was sourced to Mount Edziza flow no. 2, located approximately 105 km northwest of the site.

5.1.2.4 HdTm-3

Archaeological site HdTm-3 is a subsurface lithic scatter (Figure 5-1). The site measures 10 m (north to south) by 57 m (east to west) and is west of site HdTm-1 on a separate landform (Plate D.2-3 in Appendix D-2). Site HdTm-3 encompasses a narrow east to west trending ridge overlooking a marsh to the south and West Teigen Lake to the north. The site is approximately 10 m above the present water level of the marsh and lake. The widely dispersed archaeological materials suggest that the site encompasses the entire ridge feature, with the topography largely defining the site's boundaries (Figure D.2-4 in Appendix D-2). The site area is vegetated with hemlock and blueberry bushes.

Sixty-three shovel tests were conducted. Archaeological materials were recovered from eight shovel tests (Appendix B, Test Location 37). The recovered lithics include: one complete and five fragmented obsidian microblades, 43 obsidian flakes, and one vitric tuff flake. The average stratigraphy of the site consists of 1 cm of litter mat, followed by 2 cm of dark brown loam, followed by 3 cm of light grey sandy clay, followed by 14 cm of orangey brown sandy loam. Testing was conducted to the "C" horizon. Artifacts were recovered between 5 and 15 cm DBS.

The site is interpreted as a temporary campsite or hunting location where some tool production or retooling took place. The presence of microblade technology at the site suggests that it may date to 5,000 to 3,000 BP when a microblade industry was flourishing in the Mount Edziza region (Fladmark 1985). One obsidian artifact from HdTm-3 was sent for XRF analysis and was sourced to Mount Edziza flow no. 2, located approximately 105 km northwest of the site. Sites HdTm-1, HdTm-2, and HdTm-3 may represent repeated seasonal use of a favoured location on West Teigen Lake, potentially during spring for hunting geese or ducks or fall for hunting moose.

5.1.2.5 HdTm-4

Archaeological site HdTm-4 is a subsurface lithic scatter located in a hanging valley between Treaty Creek and West Teigen Lake (Figure 5-1). The site measures 20 m (east to west) by 15 m (north to south) and is situated on a small knoll surrounded by marshy drainages to the north and south (Plate D.2-5 in Appendix D-2). The area is in the subalpine and is characterized by uneven ground covered with patches of fir and alder.

Forty-one shovel tests were conducted (Appendix B, Test Location 20), and five obsidian flakes were recovered from three shovel tests. The average stratigraphy of the site consists of 2 cm of moss and lichen, followed by 4 cm of black loam, followed by 4 cm of grey silty clay, followed by 10 cm of reddish brown sandy silt with angular gravel, followed by 10 cm of dark brown sandy silt and angular cobbles. Bedrock was reached at 30 cm DBS. Testing was conducted until bedrock was reached. Artifacts were recovered at 5 cm DBS, within the black loam layer.

The site was likely a single use retooling site. Rocky slopes on the mountains south and east of the site provide good mountain goat habitat, which may have attracted people to this area.

5.1.2.6 HdTm-5

Archaeological site HdTm-5 is a subsurface lithic scatter located in a hanging valley between the Treaty Creek and West Teigen Lake (Figure 5-1). The site measures 22 m (north to south) by 17 m (east to west). It is located on a knoll covered with dense fir and overlooks a small pond to the east (Plate D.2-6 in Appendix D-2).

Thirty shovel tests were conducted at the site (Appendix B, Shovel 46) with one shovel test containing a single vitric tuff flake. The average stratigraphy of the site consists of a 5 cm of litter mat, followed by 3 cm of light grey silt, which is followed by 22 cm of brown silty sand. Testing was conducted to the "C" horizon. Artifacts were recovered between 3 and 8 cm DBS. The limited archaeological material found at the site suggests that it may have been a short-term retooling site.

5.1.2.7 HdTm-6

Archaeological site HdTm-6 is a subsurface lithic scatter located near the southern end of a subalpine valley near Treaty Creek (Figure 5-1; Plate D.2-7 in Appendix D-2). The site measures 26 m (north to south) by 46 m (east to west). It is on a large ridge covered with dense subalpine fir and overlooks a pond to the north. The area offers a good view of the valley as it descends south to Treaty Creek and up the valley to the north and northwest.

A total of 121 shovel tests were conducted along the ridge (Appendix B, Test Location 71). Lithic material recovered from HdTm-6 consisted of five obsidian and two quartz microblade fragments (Plate D.2-8 in Appendix D-2), two pieces of obsidian block shatter, 87 obsidian flakes, and five vitric tuff flakes (Appendix D). Three small pieces of ochre (iron oxide pigment) were identified in another shovel test. The average stratigraphy of the site consists of 1 cm of moss and litter mat, followed by 2 cm of dark brown loam, followed by 3 cm of light grey leached loam, followed by 24 cm of brown sandy loam. Testing was conducted to the "C" horizon. Artifacts tended to be found in the layer where leaching was present. Artifacts were recovered between 1 and 5 cm DBS.

The site was likely a temporary campsite. No datable carbon samples were identified; however, the presence of microblades indicates that the site may date to 5,000 to 3,000 BP (Fladmark 1985). Three obsidian artifacts from HdTm-6 were sent for XRF analysis and were sourced to Mount Edziza flow no. 3, located approximately 110 km northwest of the site.

5.1.2.8 HdTm-7

Archaeological site HdTm-7 is a subsurface lithic scatter located near an unnamed lake at the head of a tributary drainage of Teigen Creek (Figure 5-1). The site measures 15 m by 15 m and is located on a low knoll covered with dense stunted subalpine fir and blueberry bushes and is surrounded by marsh to the north, east, and southeast (Plate D.2-9 and Figure D.2-8 in Appendix D-2). Thirty shovel tests were conducted at the site, resulting in three positive tests (Appendix B, Test Location 81). A total of three obsidian flakes and one obsidian microblade were recovered.

The average stratigraphy of the site consists of 4 cm of litter mat, followed by 5 cm of light grey sandy silt, which is followed by 16 cm of reddish brown or greyish green sandy silt with pebbles. Bedrock was usually encountered around 25 cm DBS. Artifacts were recovered at 4 cm DBS, just below the litter mat. The site was likely used as a single use retooling site or temporary campsite.

5.1.2.9 HdTm-8

Archaeological site HdTm-8 is a subsurface lithic scatter located along the northern bank of a pond (Figure 5-1; Figure D.2-9 in Appendix D-2). The site measures 10 m (north to south) by 15 m (east to

west) and is located within a patch of subalpine fir that is surrounded to the west and north by grassy marsh and to the east by rolling subalpine parkland (Plate D.2-10 in Appendix D-2). Twenty-seven shovel tests were conducted, resulting in four positive tests (Appendix B, Test Location 149). In total, nineteen pieces of obsidian debitage were recovered. No diagnostic artifacts were recovered.

The average stratigraphy of the site consists of 4 cm of litter mat, followed by 16 cm of light brown, brown, or reddish brown sandy silt with angular rocks. Testing was conducted until bedrock was encountered at approximately 20 cm DBS. Artifacts were recovered just below the litter mat. Based on the limited archaeological materials found, the site was likely used as a single use retooling site or temporary campsite.

5.1.2.10 HdTm-9

Archaeological site HdTm-9 is a subsurface lithic scatter located on a small knoll (Figure 5-1). The site measures 10 m by 10 m on a knoll that rises approximately 6 m above the surrounding terrain. The area is covered with dense subalpine fir and blueberry bushes and is surrounded by subalpine meadows, wetlands, and small ponds (Plate D.2-11 and Figure D.2-10 in Appendix D-2).

Five shovel tests were conducted on the knoll, resulting in one positive test (Appendix B, Test Location 168). Six pieces of fine grained basalt debitage were recovered. The average stratigraphy of the site consists of 3 cm of litter mat, followed by 7 cm of dark brown to black sandy silt, followed by 3 cm of light grey sandy silt, followed by 7 cm of dark red sandy silt. Testing was conducted until bedrock was reached around 20 cm DBS.

The site is interpreted as a temporary camp and retooling site. Based on the limited archaeological materials, it may only represent a single use event. The site's location atop a knoll overlooking small ponds and a marsh would make it a good hunting location.

5.1.2.11 HdTm-10

Archaeological site HdTm-10 is a subsurface lithic scatter located on a small, narrow bench (Figure 5-1). The site measures 10 m (north to south) by 10 m (east to west). The bench feature begins at the base of a steep slope next to a small stream and overlooks a broad, subalpine meadow to the northwest (Plate D.2-12 and Figure D.2-11 in Appendix D-2). There is also a swampy meadow and willow marsh directly east of the site. Vegetation at the site consists of subalpine fir, willow, blueberry, heather, and moss.

Eighteen shovel tests were conducted along the bench, one of which was positive (Appendix B, Test Location 257). Twelve pieces of obsidian debitage were recovered immediately below the litter mat of the positive shovel test; no diagnostic artifacts were recovered. The average stratigraphy of the site consists of 2 cm of litter mat, followed by 18 cm of brown sandy loam with sub-angular pebbles. Testing extended to bedrock, which was usually encountered around 20 cm DBS.

Based on the limited archaeological material recovered, the site was likely used as a temporary hunting site, campsite, or single use retooling site. The excellent vantage and accessibility of the subalpine meadow to the northwest make it a favourable location. The site also overlooks sites HdTm-6, HdTm-8, and HdTm-9, which surround a small lake to the northwest.

5.1.2.12 HdTm-11

Archaeological site HdTm-11 is a subsurface lithic scatter located on an elongated east to west trending ridge to the southwest of West Teigen Lake, north of a willow wetland, and to the south of a

small stream that flows east into the lake (Plate D.2-13 and Figure in D.2-12 in Appendix D-2). The site measures 30 m (northwest to southeast) by 10 m (northeast to southwest) and is northwest of sites HdTm-1, HdTm-2, and HdTm-3, which are situated on the same topographic feature (Figure 5-1). Vegetation at the site consists of hemlock, subalpine fir, willow, blueberry, heather, and grasses.

A total of 138 shovel tests were conducted in this area along the ridge (Appendix B, Test Location 307). Two positive shovel tests were identified and two flakes were recovered, one obsidian and one vitric tuff. No diagnostic artifacts were recovered.

The average stratigraphy of the site consists of 7 cm of moss and litter mat, followed by 3 cm of grey leached silty sand with occasional gravel or tan/grey silt; followed by 25 cm of reddish brown silty sand, or brown sandy silt, with rounded pebbles, cobbles, and gravel; followed by a layer of dense cobbles and gravel after 35 cm DBS. Testing reached the "C" horizon. The obsidian artifact was recovered in the grey silty sand layer around 5 cm DBS, whereas the tuff artifact was recovered in the reddish brown silty sand land, around 20 cm DBS. The site is interpreted as a seasonal hunting or temporary campsite.

5.1.2.13 HdTn-1

Archaeological site HdTn-1 is a subsurface lithic scatter located on the north side of the Mitchell Creek Valley (Figure 5-1). The site measures 5 m by 5 m and is situated on a small subalpine plateau, part of a larger bench feature with a gentle western slope towards the confluence of McTagg and Mitchell creeks. Site HdTn-2 is located 60 m to the northwest on a different landform along the same wide bench (Plate D.2-14 and Figure D.2-13 in Appendix D-2).

Of the 271 shovel tests conducted along the large bench (Appendix B, Test Location 155), 28 of these were on the landform where HdTn-1 is situated. Two positive tests were identified at HdTn-1. A total of 27 pieces of obsidian debitage were recovered. The average stratigraphy of the site consists of 3 cm of moss and lichen, followed by 17 cm of brown or reddish brown sandy silt with roots, and 30 to 50% pebbles/cobbles (mostly angular). Testing extended to bedrock, which was encountered at or before a 20 cm DBS. The artifacts were recovered just below the litter mat at 4 to 9 cm DBS.

The site is interpreted as a single use retooling site. It may have served as a lookout over Mitchell Creek Valley or as a staging area for fall mountain goat or marmot hunting. Based on the limited archaeological materials, it may only represent a single use event. One obsidian artifact from HdTn-1 was sourced to Mount Edziza flow no. 3, located approximately 115 km northwest of the site.

5.1.2.14 HdTn-2

Archaeological site HdTn-2 is a subsurface lithic scatter located on the north side of the Mitchell Creek Valley (Figure 5-1). The site measures 5 m by 5 m and is situated on a small subalpine plateau, part of a larger bench feature with a gentle western slope towards the confluence of McTagg and Mitchell creeks. Site HdTn-1 is located 60 m to the southeast, and is on a different landform along the same wide bench (Plate D.2-15 and Figure D.2-14 in Appendix D-2).

A total of 271 shovel tests were conducted along the bench (Appendix B, Test Location 155), 30 of which were conducted on the landform where site HdTn-2 is situated. Two positive tests were identified at HdTn-2, and five pieces of obsidian debitage were recovered. The average stratigraphy of the site consists of 3 cm of moss and lichen, followed by 17 cm of brown or reddish brown sandy silt with roots, and 30 to 50% pebbles/cobbles (mostly angular). Testing extended to bedrock, which was encountered at or before a 20 cm DBS. The artifacts were recovered just below the litter mat at 3 to 6 cm DBS.

The site was likely used as a single use retooling site. It may have served as a lookout over Mitchell Creek Valley based on the limited archaeological materials; it may only represent a single use event.

5.1.2.15 HdTo-1

Archaeological site HdTo-1 is a subsurface lithic scatter located in an area of rolling subalpine knolls and ridges on the west flank of John Peaks, northeast of the confluence of the Unuk River and Sulphurets Creek (Figure 5-1). The site measures 66 m (north to south) by 42 m (east to west) and is situated on two small ridges atop a large hill feature overlooking a gully to the west (Plate D.2-16 and Figure D.2-15 in Appendix D-2). A dry channel runs north to south between the ridges and divides the site roughly through its centre. Patches of dense fir are found throughout the site area. Fifty-three shovel tests were conducted at the site (Appendix B, Test Location 58). Nine positive shovel tests resulted in a total of 287 pieces of lithic debitage and tools. Tools and tool fragments recovered consisted of two vitric tuff microblades, one obsidian endscraper, and two banded vitric tuff preform fragments (Plate D.2-17 in Appendix D-2). A total of 275 pieces of vitric tuff debitage and seven pieces of obsidian debitage were also recovered.

The average stratigraphy of the site consists of 3 cm of litter mat with dense roots, followed by 12 cm of dark brown clay loam, which is followed by 20 cm of compact brown silty loam. A layer of rocks is encountered at around a 15 cm DBS. Artifacts were recovered just below the litter mat around 5 cm DBS.

Site HdTo-1 is situated a short distance from a fresh water source, a mountain runoff 100 m east. The site is interpreted as a temporary campsite and retooling area, and it may have been used seasonally as a fall base camp for staging mountain goat hunts on John Peaks or marmot hunting around the site. One obsidian artifact from HdTo-1 was sourced to flow no. 3 at Mount Edziza (approximately 110 km northwest), while the vitric tuff is thought to be a locally available raw material.

5.1.2.16 HdTo-2

Archaeological site HdTo-2 is a subsurface lithic scatter on a ridge situated at the base of a steep embankment on the west flank of John Peaks and measures 100 m (north to south) by 15 m (east to west; Figure 5-1; Plate D.2-18 and Table D.2-46 in Appendix D-2). To the west, the site is surrounded by grassy meadows and shallow ponds. Several seasonal drainages cascade down the embankment, feeding into an unnamed stream that runs along the east side of the site. Thirty shovel tests were conducted along the ridge, resulting in five positive tests (Appendix B, Test Location 174). Nine pieces of obsidian debitage were recovered.

The average stratigraphy of the site consists of 4 cm of litter mat, followed by 6 cm of light grey sandy silt or mottled brown/black silt, followed by 3 cm of light grey sandy silt, followed by 7 cm of brown or reddish brown sandy silt with rocks and/or roots. A layer of rocks was usually encountered around 20 cm DBS. Artifacts were recovered between 0 and 10 cm DBS.

Site HdTo-2 was likely used as a temporary camp and retooling site, with an assemblage consisting entirely of late-stage reduction obsidian flakes.

5.1.2.17 HdTo-3

Archaeological site HdTo-3 is a subsurface lithic scatter on the west flank of John Peaks, 2 km east of the Unuk River (Figure 5-1; Table D.2-49 in Appendix D-2). The site measures 15 m (north to south) by 7 m (east to west) and is located on the southern portion of a ridge that is predominantly exposed bedrock with patches of shallow soil development and a cover of stunted subalpine fir and moss (Plate D.2-19 in

Appendix D-2. The surrounding terrain has a gentle-moderate northwest slope characterized by numerous north to south trending bedrock ridges and numerous small ponds and wetlands.

Fifteen shovel tests were conducted along the ridge, resulting in two positive tests (Appendix B, Test Location 175). In total, eight pieces of vitric tuff debitage were recovered.

The average stratigraphy of the site consists of 3 cm of litter mat, followed by 6 cm of light grey sandy silt, followed by 11 cm of mottled dark brown/black sandy loam, followed by 5 cm of reddish brown sandy silt. Testing was conducted to the "C" horizon or bedrock, which was encountered around 25 cm DBS. Artifacts were recovered just below the litter mat.

The site is interpreted as a single use retooling site. Two samples of vitric tuff were sent for XRF analysis; however, the results were found to be too ambiguous to identify a specific source. The vitric tuff found at HdTo-3 appears to be similar to the type of lithic material that was identified at nearby site HdTo-1, and in both cases, the vitric tuff is thought to be from a local source.

5.1.2.18 HdTo-4

Archaeological site HdTo-4 is a petroform site (rock alignment) located on a subalpine ridge on the west flank of John Peaks, 2 km east and 700 m above the Unuk River (Figure 5-1; Table D.2-52 in Appendix D-2). The site boundaries measure 12 m (northeast to southwest) by 8 m (southeast to northwest). The level portion of the ridge, on which the site is situated, measures 10 m (east to west) by 20 m (north to south) and is covered with shrubby subalpine fir and moss (Plate D.2-20 in Appendix D-2. The surrounding terrain is characterized by numerous north to south trending bedrock ridges and a gentle-moderate northwest slope.

The petroform was constructed using irregularly shaped angular cobbles. It is 3 m long (oriented 60°/240°), 70 cm wide, and 50 cm high. Fifteen shovel tests were conducted around the feature and along the ridge, with negative results (Appendix B, Test Location 159). The average stratigraphy at the site consists of 3 cm of litter mat, followed by 12 cm of brown sandy silt with 10% angular gravels. Testing was conducted until bedrock was reached, which usually occurred around 15 cm DBS. No artifacts were found within either soil layer.

The antiquity of the feature is not certain. A segment of hip chain was found nearby and a recent mineral claim stake was recorded 14 m to the southwest, so it is possible that it is a historic claim marker related to mineral exploration in the region. However, the presence of three prehistoric sites within 500 m of the feature and the moderate lichen growth over the stones suggests that site HdTo-4 may be prehistoric.

Although, no specific function can be attributed to HdTo-4, ethnographically, rock cairns were constructed for a number of purposes, including wind breaks, hunting blinds, or to mark burials and other important places.

5.1.2.19 HdTo-5

Archaeological site HdTo-5 is a subsurface lithic scatter located in the subalpine 3 km southeast of John Peaks (Figure 5-1; Figure D.2-19 in Appendix D-2). The site measures 10 m (southwest to northeast) by 7 m (southeast to northwest) and is located at approximately 1,400 masl along the ridge that forms the southwest wall of Gingras Creek Valley, next to a sheer drop-off of approximately 400 m from the site to the creek (Plate D.2-21 in Appendix D-2).

The site is situated on the south edge of a small knoll. There is a single patch of dense shrubby subalpine fir located at the western edge of the knoll; otherwise, the only vegetation consists of moss and lichen. The knoll is generally level, except for a prominent rise at its eastern end. In several areas, the ground surface contains large exposed boulders or soil. The surrounding topography slopes steeply to the north (towards Gingras Creek), south (towards Sulphurets Creek), and moderately to the southeast down the ridge (towards Mitchell Creek). The subalpine area immediately surrounding the site consists of a series of small subalpine knolls, plateaus, and ridges.

Seventeen shovel tests and an examination of surface exposures were conducted (Appendix B, Test Location 188). A single artifact, a utilized obsidian flake, was recovered from one of the shovel tests. The artifact from HdTo-5 was sourced to flow no. 3 at Mount Edziza (approximately 110 km north).

The average stratigraphy of the site consists of 3 cm of moss and litter mat, followed by 15 cm of brown sandy silt. Testing was conducted until bedrock was reached, which was usually at 18 cm DBS. The artifact was recovered just below the litter mat. Based on the limited material found at the site HdTo-5 it is interpreted as a temporary campsite.

5.1.2.20 HdTo-6

Archaeological site HdTo-6 is a subsurface lithic scatter located on a long, narrow ridge overlooking Tom Mackay Creek to the west and a small lake and marsh to the northwest (Figure 5-1; Plate D.2-22 and Figure D.2-20 in Appendix D-2). The site measures 10 m by 10 m. It is 130 m west of the Eskay Creek Mine Road, at approximately 54.3 km, and approximately 2 km northeast of Tom Mackay Lake. A series of ridges run through the area above the creek and marsh. The marsh is predominantly willow, while vegetation on the ridges consists of subalpine fir, hemlock, juniper, heather, and moss.

Seventy-five shovel tests were conducted along the ridge at the site, resulting in one positive test (Appendix B, Test Location 211). Two obsidian flakes were recovered from the positive test, 5 to 10 cm below the surface. No diagnostic artifacts were recovered.

The average stratigraphy of the site consists of 3 cm of litter mat, followed by 12 cm of brown or orangey brown sandy silt, which is followed by 15 cm of brown or orangey brown sandy silt, or greyish brown sand. Testing extended to bedrock, which was usually encountered around 30 cm DBS.

The site is interpreted as a seasonal hunting site or temporary campsite. The position offered by the ridge over the marsh and lake below make it a favourable location from which to hunt moose and waterfowl. Historical remains, including several cut trees and fire pits, were also documented at the site.

5.2 HISTORIC AND RECENT LAND USE FEATURES

During the AIA, historic and recent land use features encountered in the field were recorded (Figure 5-2) and are discussed in this section. This included features related to trapline cabins, mineral exploration (rock features, drill pads, mining claim markers, and cabins), and CMTs (blazed trees and trap trees). All of these features date to the twentieth century, and as such, none are protected by the HCA. This section is not a comprehensive list of all land use features in the Project area. For additional information on land use in the Project area please refer to the *Land Use Baseline Study* (Rescan 2011), as well as the *Land and Resource Use Baseline Study* (Rescan 2010d) prepared for the Project.

5.2.1 Trapline Cabins

Two cabins related to trapping activities are described below.

5.2.1.1 Historic Feature C-1

Historic feature C-1 is the remains of a collapsed log cabin and two CMTs located near Seabridge's Seabee Exploration Camp, along Teigen Creek near its confluence with an unnamed eastern tributary (Figure 5-2). Forest cover in the area consists of mature cottonwood and subalpine fir, with a dense understory of devil's club and alder. The terrain is hummocky and has a gentle north slope.

The collapsed cabin is located 40 m west of the Seabee Exploration Camp area and immediately east of Teigen Creek. In addition to log debris from the cabin, an iron stove (manufactured ca. 1930s) and scattered historic debris was observed (Plate 5.2-1). The two recent CMTs, a blazed and a notched cottonwood, were identified within the Seabee Exploration Camp area, east of the cabin (Plate 5.2-2). Both trees were avoided during construction of the camp. This cabin may have belonged to Matthew Teigen who trapped along Teigen Creek in the early twentieth century.

Plate 5.2-1. Historic debris at Historic Feature C-1.

Plate 5.2-2. Blazed tree at Historic Feature C-1.

5.2.1.2 Historic Feature C-2

Historic feature C-2 is a log cabin with a new metal roof located on the east side of Teigen Lake near its main outlet drainage (Figure 5-2). This may be a trapline cabin; however for additional information on land use of the Project area, please refer to Rescan 2011.

5.2.2 Mineral Exploration Features and Cabins

Historic features related to mineral exploration recorded during the AIA are described in this section, including mineral claim markers, rock cairns, drill pads and related debris, and three cabins (C-3 to C-5). All of the features appeared to post-date the 1930s. The most common mining features encountered were mineral claim markers and rock features, such as cairns or rock piles. Most were found in the alpine and subalpine areas near Sulphurets Creek and Tom Mackay Lake (Table 5.2-1; Figure 5-2). In subalpine and alpine areas, it was frequently necessary for prospectors to construct rock cairns to mark their claim boundaries (Faulkner 1986). One rock cairn was recorded as archaeological site HdTo-4 as it was identified in close proximity to archaeological sites HdTo-1 to HdTo-3 and could not be definitively associated with mining. All other rock features recorded during the AIA are definitively associated with recent or twentieth century claim staking.

Table 5.2-1. Identified Mineral Exploration Features

ID #	Location	Description
M-1	Alpine north of Treaty Creek	Rock cairn on mountain top with heliski pole nearby
M-2	East of Tom Mackay Lake	Rock cairn for survey post reference stake
M-3	East of Tom Mackay Lake	Rock cairn with plastic lodged underneath stone
M-4	East of Tom Mackay Lake	Metal legal survey post
M-5	East of Tom Mackay Lake	Rock cairn with flagging tape beneath it
M-6	East of Tom Mackay Lake	Rock cairn with flagging tape beneath it
M-7	Alpine northeast of Sulphurets Creek	Rock cairn – claim marker
M-8	Alpine northeast of Sulphurets Creek	Rock pile with wood claim marker stake
M-9	Alpine northeast of Sulphurets Creek	Two linear rock alignments with historic debris (ceramic bowl fragments)
M-10	Alpine northeast of Sulphurets Creek	Rock pile with wood claim marker stake
M-11	Alpine northeast of Sulphurets Creek	Small recent rock pile (likely claim marker)
M-12	Alpine northeast of Sulphurets Creek	Rock pile with wood claim marker stake
M-13	Alpine southeast of Sulphurets Creek	L-shaped rock alignment with several wood stakes
M-14	Alpine east of Storie Creek	Claim marker (“# 118392 May 13, 89”)
M-15	East of Tom Mackay Lake	Claim marker (“1994”)
M-16	East of Tom Mackay Lake	Claim marker (“1994 Mack 23”)
M-17	Alpine northeast of Sulphurets Creek	Claim marker near historic debris
M-18	East of Tom Mackay Lake	Claim marker (metal tag on cut stump)
M-19	East of Tom Mackay Lake	Claim marker (metal tag on cut stump)
M-20	East of Tom Mackay Lake	Claim marker (metal tag on cut stump)
M-21	Alpine northeast of Sulphurets Creek	Claim marker (wooden stake with flagging tape)
M-22	Alpine northeast of Sulphurets Creek	Claim marker
M-23	Alpine northeast of Sulphurets Creek	Geological sampling location (metal tag)
M-24	Alpine northeast of Sulphurets Creek	Old drill pad
M-25	Alpine northeast of Sulphurets Creek	Historic debris (wood stakes and bailing wire)
M-26	Alpine northeast of Sulphurets Creek	Old drill collar
M-27	East of Tom Mackay Lake	Claim marker (metal tag)
M-28	Mitchell-Sulphurets confluence	Claim marker (metal tag)
M-29	Treaty Creek	Wooden wedges and wire
M-30	Mitchell-Sulphurets confluence	Drainage pipe strung to tree
M-31	Sulphurets-Ted Morris confluence	Claim marker (metal tag on cut stump)
M-32	Iron cap area of Mitchell Pit	Rock pile with recent garbage
M-33	Iron cap area of Mitchell Pit	Rock cairn with metal pin (“104B 879439 GSC”)
M-34	Saddle Area road alignment	Claim stake with tin can
M-35	Coulter Creek Access Road Realignment	Core boxes, debris, and open well associated with mineral exploration
M-36	Steep slope to the east the Coulter Creek Access Road alignment	Possible blasted cave associated with mineral exploration.

5.2.2.1 Historic Feature C-3

Historic feature C-3 consists of two collapsed cabins overlooking a pond approximately 200 m east of Coulter Creek. The cabins are 3 m apart and measure approximately 4 m (northeast to southwest) by 5 m (northwest to southeast; Figure 5-2; Plate D.2-23 and Table D.2-58 in in Appendix D-2). Cookware and 15 ore smelting challises were noted around the cabins. Core boxes were identified approximately 100 m northwest of the cabins.

5.2.2.2 Historic Feature C-4

Historic feature C-4 consists of two log structures located in a clearing on a low terrace east of Mitchell Creek, approximately 1 m above the creek's late summer level (Figure 5-2; Table D.2-59 in Appendix D-2). Several fuel drums and two large spools of metal cable are located in the clearing. Site C-4 is likely related to twentieth century placer mining or mineral exploration in the Mitchell Creek Valley.

The larger structure measures approximately 7 m (north to south) by 10 m (east to west), and a smaller (3 m by 3 m) shed is located 5 m north (Plate D.2-24 in Appendix D-2). The larger structure was likely a bunk house or mixed live/work space with either two stories or an open loft. This structure has been significantly undercut by erosion along the bank of Mitchell Creek (Plate D.2-25 in Appendix D-2); however, the shed remains in good condition.

5.2.2.3 Historic Feature C-5

Historic feature C-5 is the remains of a small prospecting camp located northeast of the confluence of McTagg and Mitchell creeks (Figure 5-2). The camp is situated on a terrace north of Mitchell Creek, which drops steeply down to the creek bed, approximately 20 m below. The site area is heavily forested with hemlock and fir and is overgrown with blueberry and ferns. All of the historic features are severely rotten and appear to have been abandoned for at least 20 to 30 years.

The main camp area includes the base of a log cabin or the foundation for a prospecting tent measuring approximately 3 m by 3 m (Plate D.2-26 and Table D.2-60 in Appendix D-2). A semi-circular structure, approximately 2 m in diameter, is located immediately east of the cabin. This structure is constructed from upright posts (about 1.5 m high) that are braced with two-by-four lumber (Plate D.2-27 in Appendix D-2). This feature is likely for storage and could be a food cache or a water tank. Around the main camp area, a possible privy and several stumps and blazes were recorded. A pile of core is located 30 m east of cabin, and a small clearing was observed north of the cabin, which may have been the site of another structure.

5.2.3 Historic CMTs and Trails

Blazed trees, trap trees, and trails that were recorded during the AIA are described in Table 5.2-2 and shown on Figure 5-2. Some of the trees may be Aboriginal CMTs; however, because these are all clearly recent, twentieth century features, many could also be related to historic prospecting and/or trapping by non-Aboriginal people. Likewise, trails identified during the AIA are believed to be related to prospecting. However, it is possible that they follow the routes of older Aboriginal trails.

Table 5.2-2. Identified Historic Blazes and Trap Trees

ID #	Location	Description
B-1	North shore of Hodkin Lake	Blazed tree
B-2	North shore of Hodkin Lake	Blazed tree
B-3	North shore of Hodkin Lake	Blazed tree
B-4	North shore of Hodkin Lake	Blazed tree
B-5	Near Snowbank Creek	Three blazed trees
B-6	South of unnamed lake	Blazed tree

(continued)

Table 5.2-2. Identified Historic Blazes and Trap Trees (completed)

ID #	Location	Description
B-7	Treaty Creek Valley near Tim Williams Creek	Possible knotted tree
B-8	Near Coulter Creek	Blazed tree with old surveyors tape
B-9	Near Coulter Creek	Blazed tree
B-10	Near Coulter Creek	Blazed trail running at a bearing of 200 degrees
B-11	Near the Unuk-Sulphurets confluence	Trap tree
B-12	Near the Unuk-Sulphurets confluence	Target tree
B-13	West of the Unuk River	Blazed tree
B-14	Mitchell-McTagg confluence	Blazed tree and axed limb
B-15	Treaty Creek Road Alignment (Eastern End)	Trap tree, machete embedded in a tree, and a cut tree on either side of a fast flowing stream
B-16	Treaty Creek Road Alignment (Eastern End)	Trail furrow running east to west with numerous sawn logs and blazed trees
B-17	Treaty Creek Road Alignment (Eastern End)	Axe blazed tree along trail B-16
B-18	Treaty Creek Road Alignment (Eastern End)	Axe blazed tree along trail B-16
B-19	Treaty Creek Road Alignment (Eastern End)	Axe blazed tree along trail B-16
B-20	Treaty Creek Road Alignment (Eastern End)	Axe blazed tree along trail B-16
B-21	Treaty Creek Road Alignment (Eastern End)	Axe blazed tree along trail B-16
B-22	Coulter Creek Access Road Realignment	Five blazed hemlock (blazed trees run north to south)
B-23	Coulter Creek Access Road Realignment	Blazed hemlock
HdTo-6	Construction Camp 3	Cut trees and fire pits at site HdTo-6
HcTp-1	Near the Unuk and Sulphurets confluence	Trap tree beside cabins
HeTl-2	Near Snowbank Creek	Trap tree beside telegraph cabin

6. Evaluation of Archaeological Site Significance

The purpose of the archaeological site significance evaluations is to provide an assessment of the relative significance of the 34 archaeological sites identified within the Project area. The significance assessment results for the Project are presented in Table 6-1 below.

Table 6-1. Assessment of Site Significance

Site #	Scientific Significance	Public Significance	Ethnic Significance	Economic Significance	Historic Significance	Overall Rating
HcTj-1	Low	Moderate	High	Low	High	High
HcTn-1	Moderate	Low	High	Low	N/A	Moderate
HcTp-1	Low	Moderate	High	Moderate	Moderate	Moderate
HdTk-1	High	Moderate	High	Low	High	High
HdTk-2	Low	Low	High	Low	Moderate	Low
HdTk-3	Low	Low	High	Low	N/A	Low
HdTl-1	Low	Low	High	Low	N/A	Low
HdTj-1	Low	High	High	Moderate	High	High
HdTm-1	Moderate	Low	High	Low	N/A	Moderate
HdTm-2	Low	Low	High	Low	N/A	Low
HdTm-3	Moderate	Low	High	Low	N/A	Moderate
HdTm-4	Low	Low	High	Low	N/A	Low
HdTm-5	Low	Low	High	Low	N/A	Low
HdTm-6	High	Low	High	Low	N/A	High
HdTm-7	Moderate	Low	High	Low	N/A	Moderate
HdTm-8	Low	Low	High	Low	N/A	Low
HdTm-9	Low	Low	High	Low	N/A	Low
HdTm-10	Low	Low	High	Low	N/A	Low
HdTm-11	Low	Low	high	Low	N/A	Low
HdTn-1	Low	Low	High	Low	N/A	Low
HdTn-2	Low	Low	High	Low	N/A	Low
HdTo-1	High	Low	High	Low	N/A	High
HdTo-2	Low	Low	High	Low	N/A	Low
HdTo-3	Low	Low	High	Low	N/A	Low
HdTo-4	High	Moderate	High	Low	N/A	High
HdTo-5	Low	Low	High	Low	N/A	Low
HdTo-6	Low	Low	High	Low	N/A	Low
HeTk-1	Low	Low	High	Low	N/A	Low
HeTk-2	Low	Low	High	Low	N/A	Low
HeTk-3	Low	High	High	Moderate	High	High
HeTl-1	Low	Low	High	Low	N/A	Low
HeTl-2	Low	High	High	Moderate	High	High
HfTm-2	Low	Low	High	Low	N/A	Low
HfTm-3	Low	Low	High	Low	N/A	Low

Sites identified in the Project area were assessed using the checklist of criteria for site evaluation presented in the *British Columbia Archaeological Impact Assessment Guidelines* (Archaeology Branch 1998). These guidelines define five heritage significance evaluation categories for archaeological sites: scientific, public, ethnic, economic, and historic (where applicable). Each identified site was assessed and rated as having a high, moderate, or low significance value. The definitions of each type of significance assessment are as follows:

1. Scientific Significance: The potential of a site to provide information that could enhance our understanding of British Columbia's heritage resources, particularly its ability to contribute to various scientific disciplines, and its ability to contribute to an understanding of local and regional prehistory. For lithic sites, key considerations are the presence of unique or temporally-sensitive artifact types, density and variety of archaeological material, and the potential for multi-components or datable material. Disturbed sites are generally rated as having low scientific significance.
2. Ethnic Significance: The importance, significance, or value of a site as perceived by an ethnically distinct community or group. The ethnic significance is assumed to be high for all sites as the Project area is subject to several overlapping First Nations traditional territories and no single "ethnic value" for the sites is likely to be achieved.
3. Public Significance: The potential a site has to enhance public awareness, interest, understanding, or appreciation of British Columbia's prehistoric or historic past, such as its interpretive, education, and recreational potential. Currently the Project area is primarily accessible by helicopter. It is anticipated that if the proposed roads to the Project are built, public access would be limited. However, in rating of public significance it is assumed that at some point in the future there may be an increase in public access and the value of the sites with regards to heritage tourism and public interpretation is considered.
4. Economic Significance: The potential for a site to contribute or generate monetary benefits or employment through its development and use as a public recreational or educational facility. Similar to the evaluation of public significance, future increase in public access is assumed and its potential impact to the sites' economic value is considered.
5. Historic Significance: The degree to which a site represents or relates to important historical individuals or events.

The scientific significance of sites HcTn-1, HdTm-6, HdTo-1, HdTo-4, HdTm-1, HdTm-3, and HdTm-7 are rated as being moderate or high due to their potential to increase the knowledge of regional prehistory. These sites generally have higher density, a variety of archaeological materials, or the presence of distinctive artifact types, or, as in the case of HdTo-4, the uniqueness of the site type.

Public significance was rated as moderate or high in cases where the site contained features that are amenable to public interpretation or represented an important historic event in the region. Sites HcTj-1 and HdTk-2 both contain potential burials. Site HdTj-1 is the historic Treaty Creek Site. HeTk-3 and HeTl-2 are historic Telegraph line cabin sites and HdTo-4 contains a rock alignment.

Sites HdTl-1, HdTm-2, HdTm-4, HdTm-5, HdTm-8, HdTm-9, HdTn-1, HdTn-2, HdTo-2, HdTo-3, HdTo-5, HeTl-1, HcTn-1, HdTk-3, HfTm-2, and HfTm-3 are rated as having low scientific significance as these are small sites with relatively sparse archaeological material and diagnostic artifacts were not found. Site HdTj-1 is a significant historic Aboriginal treaty site recorded as part of the Nisga'a Final Agreement.

Historic archaeological sites HcTp-1, HeTk-3, and HeTl-2 were assessed as having moderate or high significance due to the presence of standing structures that could have some public or economic value.

The ethnic significance of all sites is rated as high; although the overlapping nature of their asserted traditional territories may mean that some sites may be more or less significant to a particular group, or they may be important for different reasons.

The economic significance was rated as moderate for sites HeTk-3 (Bell-Irving telegraph cabin), HeTl-2 (Snowbank Creek telegraph cabin), HcTp-1 (trap line cabin), and HdTj-1 (Treaty Creek site) because of their historic significance and the potential that these sites could be developed for cultural tourism purposes.

7. Assessment of Impact Potential and Management Recommendations

The AIA identified 34 archaeological sites in the Project area (20 new sites and 14 previously recorded sites). This section assesses potential impacts to these sites to determine if their integrity will be altered by the Project and provides site-specific and general management recommendations for the Project.

The site-specific assessment of impact potential is presented in Table 7-1. Developments that involve excavation, movement, or disturbance of soils have the potential to impact archaeological materials, if present. Increased human presence in an area can also result in impact to sites. The assessment of impacts to archaeological sites considers the potential magnitude, duration, severity, frequency, rate of change, cumulative effect, and range of the effects.

Table 7-1. Assessment of Potential Impacts to Archaeological Sites

Site #	Nearest Project Component	Distance to Project Component	Type of Impact	Potential Impacts	Probability of Impact
HcTj-1	Taft Fish Habitat Compensation Area	9 km	No impact	None	Low
HcTn-1	Kerr Pit Haul Road	3.1 km	No impact	None	Low
HcTp-1	Coulter Creek South Realignment	1.6 km	No impact	None	Low
HdTj-1	Treaty Creek Access Road	4.8 km	No impact	None	Low
HdTk-1	Oweegee Fish Habitat Compensation Area	42 m	Indirect	Increased human presence	Low/ Moderate
HdTk-2	Oweegee Fish Habitat Compensation Area	272 m	No impact	None	Low
HdTk-3	Treaty Creek Access Road	808 m	No impact	None	Low
HdTl-1	Treaty Creek Access Road/TMF	226 m	Indirect	Increased human presence	Low
HdTm-1	Tunnel Spur Access Road	185 m	Indirect	Increased human presence	Low
HdTm-2	Tunnel Spur Access Road	164 m	Indirect	Increased human presence	Low
HdTm-3	Tunnel Spur Access Road	233 m	Indirect	Increased human presence	Low
HdTm-4	Tunnel Spur Access Road	166 m	Indirect	Increased human presence	Low
HdTm-5	Tunnel Spur Access Road	316 m	No impact	None	Low
HdTm-6	Tunnel Spur Access Road	128 m	Indirect	Increased human presence	Low
HdTm-7	Tunnel Spur Access Road	40 m	Direct/ indirect	Road and ore haulage tunnel construction; increased human presence	High
HdTm-8	Tunnel Spur Access Road	140 m	Indirect	Increased human presence	Low
HdTm-9	Tunnel Spur Access Road	222 m	Indirect	Increased human presence	Low
HdTm-10	Tunnel Spur Access Road	209 m	Indirect	Increased human presence	Low
HdTm-11	Tunnel Spur Access Road	350 m	No impact	None	Low
HdTn-1	Mitchell Pit	0 m	Direct	Construction of the Mitchell Pit	High
HdTn-2	Mitchell Pit	0 m	Direct	Construction of the Mitchell Pit	High

(continued)

Table 7-1. Assessment of Potential Impacts to Archaeological Sites (completed)

Site #	Nearest Project Component	Distance to Project Component	Type of Impact	Potential Impacts	Probability of Impact
HdTo-1	Coulter Creek South Realignment	2.2 km	No impact	None	Low
HdTo-2	Coulter Creek South Realignment	2.2 km	No impact	None	Low
HdTo-3	Coulter Creek South Realignment	1.9 km	No impact	None	Low
HdTo-4	Coulter Creek South Realignment	1.9 km	No impact	None	Low
HdTo-5	McTagg Diversion Tunnel South Portal Structures	1.2 km	No impact	None	Low
HdTo-6	Construction Camp	0 m	Direct	Construction of Construction Camp 3	High
HeTk-1	Oweegee Fish Habitat Compensation Area	4.5 km	No impact	None	Low
HeTk-2	Teigen Powerline	10 km	No impact	None	Low
HeTk-3	Teigen Powerline	6 km	No impact	None	Low
HeTl-1	Snowbank Fish Habitat Compensation Area	118 m	Indirect	Increased human presence	Low
HeTl-2	Teigen Powerline Access road	170 m	Indirect	Increased human presence	Low
HfTm-2	Snowbank Fish Habitat Compensation Area	11.4 km	No impact	None	Low
HfTm-3	Snowbank Fish Habitat Compensation Area	11.3 km	No impact	None	Low

The archaeological site impacts have been assessed using the currently proposed Project footprint (see Figure 7-1a to 7-1i). Sites anticipated to be directly impacted by the Project are within the Project footprint, and the probability of impact to these sites from Project construction is high. Archaeological sites that are outside of, but in close proximity to, the Project footprint are at low to moderate risk of impact due to potential for indirect impacts from increased human presence near the sites.

7.1 SITE-SPECIFIC MANAGEMENT RECOMMENDATIONS

Site-specific management recommendations are presented below and should be reviewed and considered prior to initiation of any land-altering development activities. Avoidance of archaeological sites is the preferred management recommendation. To ensure avoidance is achieved, Project staff should be educated about this requirement, and sites should be marked as No Work Zones on Project construction maps. Where avoidance is not possible, any alteration to an archaeological site protected under the HCA would require a Section 12 Site Alteration Permit from the Archaeology Branch. Additional mitigation measures (e.g., systematic data recovery) may also be required and would be determined in consultation with the Archaeology Branch.

Sites HcTj-1, HcTn-1, HcTp-1, HdTj-1, HdTk-2, HdTk-3, HdTm-5, HdTm-11, HdTo-1, HdTo-2, HdTo-3, HdTo-4, HdTo-5, HeTk-1, HeTk-2, HeTk-3, HfTm-2, and HfTm-3

No impacts are anticipated for these sites as they are located outside of proposed Project components. No further work is required. It is recommended that these sites be marked as No Work Zones on development maps.

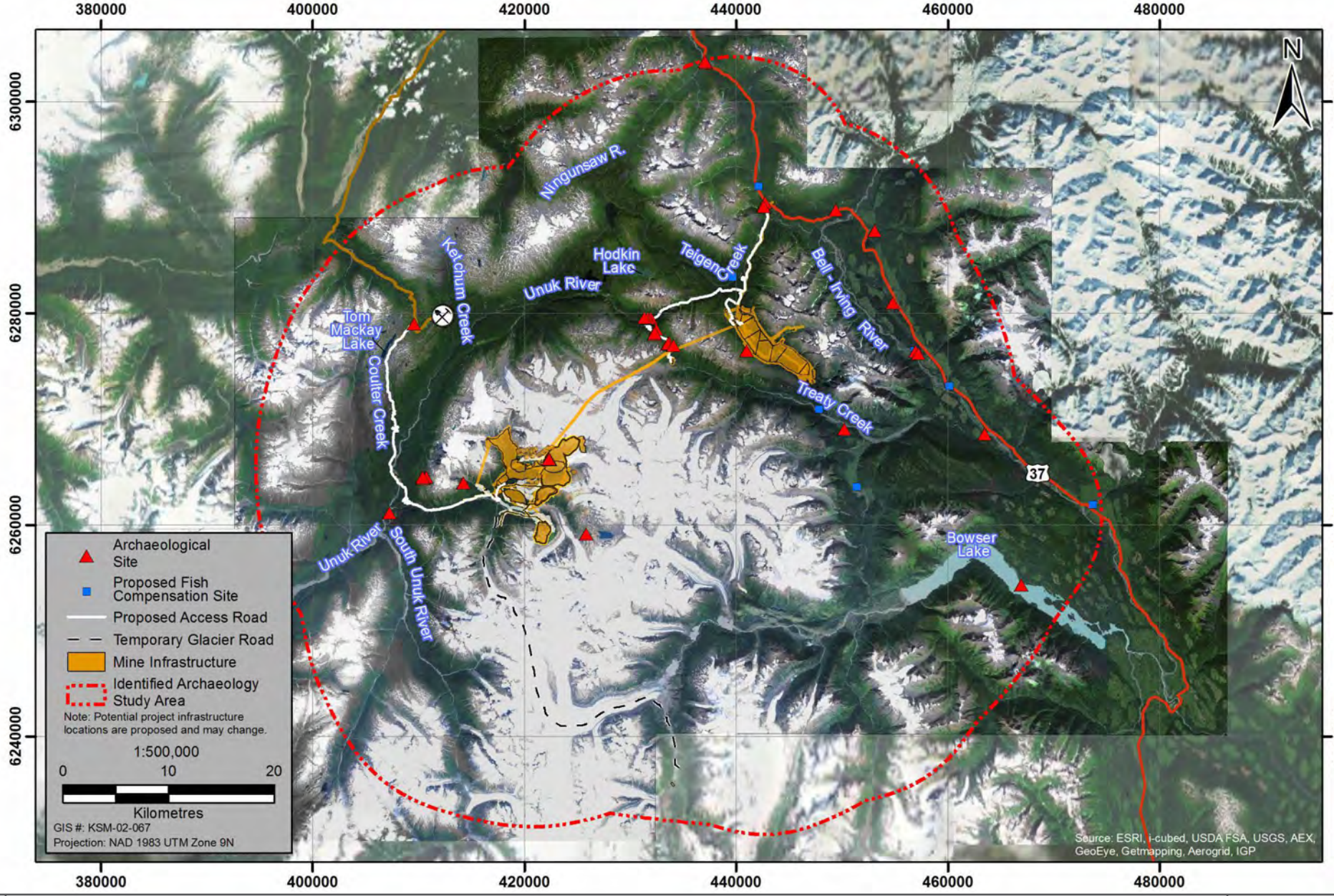

Figure 7-1a

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Archaeological Sites in Relation to Proposed Developments

Figure 7-1a

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Figures 7-1b through 7-1i have been removed from the public version of this report to protect the locational information of archaeological sites illustrated on the figures. Additional information can be obtained from the complete version of this report, which is on file with the BC Archaeology Branch.

Sites HdTk-1, HdTl-1, HdTm-1, HdTm-2, HdTm-3, HdTm-4, HdTm-6, HdTm-8, HdTm-9, HdT-10, HeTl-1, and HeTl-2

These sites are located outside of the current Project footprint and are not at risk of direct impact from the Project. However, the Project would result in increased human presence in the general area, which could result in indirect impact to the sites. It is recommended that Project staff be educated on the proper protocols for managing the known archaeological sites in the Project area and that the site areas are marked as "No Work Zones" on Project construction maps. If the Project footprint changes and approaches any of these sites, then further work may be required.

Site HdTm-7

This site is within 50 m of the Tunnel Spur Access Road, and while it is outside of the development footprint, it is a high risk of potential impact during construction. Avoidance is the preferred management recommendation. This site should be indicated on development maps and clearly marked in the field as a No Work Zone. If avoidance is not possible, mitigation measures are recommended. Mitigation would be determined in consultation with the Archaeology Branch and may include acquiring a Site Alteration Permit from the Archaeology Branch, systematic data recovery, construction monitoring, and/or capping.

Sites HdTn-1, HdTn-2, and HdTo-6

These sites are in direct conflict with the Project footprint, including the proposed Mitchell Pit (HdTn-1 and HdTn-2), and Construction Camp 3 (HdTo-6). Avoidance through Project redesign is the preferred management recommendation. If avoidance is not possible mitigation measures, to be determined in consultation with the Archaeology Branch, are recommended. Mitigation may include systematic data recovery; construction monitoring, and/or capping. Any alteration to these sites would require Section 12 Site Alteration permits issued by the Archaeology Branch.

7.2 GENERAL PROJECT RECOMMENDATIONS

The snow/ice patches and glacier margins in the Project area generally have archaeological potential. While no archaeological materials were observed in any of these areas, due the potential for finds it is recommended that archaeological monitoring be conducted in areas where the Project is in close proximity to or may impact snow/ice patches (such as in the Iron Cap area) or glacier margins (Mitchell Glacier and McTagg Creek).

No further archaeological assessment is recommended for other areas of the currently proposed Project footprint. Any revisions to the currently proposed Project footprint should be reviewed by a qualified professional archaeologist. Seabridge is advised that even the most thorough study may not identify all archaeological resources that may be present, and an Archaeological Chance Find Procedure should be implemented prior to the commencement of ground altering activities. All Project staff should be familiarized with the procedure and the protocols for managing the known archaeological sites and any chance finds that may occur during construction.

The management options and recommendations presented above are offered by Rescan and are subject to review and acceptance by the Archaeology Branch.

8. Discussion and Conclusions

Prior to the AIA for the Project, little archaeological research had been conducted in the Unuk, Teigen, and Treaty watersheds. While the extensive history of prospecting and mineral exploration in the Project area was relatively well-documented through provincial government reports (see Section 2.5.3), the prehistory of the area was not well understood.

Rousseau (1990) suggests that the prehistoric use of the nearby Eskay Creek project area during the mid-late Holocene (ca. 4,000 to 200 BP) may have been limited to "small hunting parties during the snow-free summer months," but that the area may have been more intensively used during the early to mid-Holocene when the climate was warmer and drier. This is similar to Fladmark's (1985) interpretation that prehistoric use of the Mount Edziza area was less intense during the Neoglacial period (3,000 to 150 BP) when the glaciers and snowpack were more extensive than during the Hypsithermal period (8,000 to 3,000 BP). A similar scenario may have occurred in the Project area. The subalpine areas, where many of the archaeological sites were recorded during the AIA, were likely much less hospitable locations throughout the past 3,000 to 4,000 years. In addition, volcanic activity on the lower Unuk River during the late Holocene (see Section 2.2) would have, at least temporarily, caused difficulties for people occupying the upper Unuk watershed during this time by disrupting fisheries, trade routes, and animal migration patterns. Patterns of use in this mountainous and volcanic region would have changed through time in response to sometimes dynamic environmental conditions.

Nineteen of the new sites identified during the AIA are lithic scatters. The assemblages exhibit a variety of lithic raw material, including vitric tuff, quartz, fine-grained basalt, and obsidian, and are largely composed of tertiary debitage, including biface thinning and pressure/finishing flakes. Formed tools and cores are notably absent from most of the sites. All of the lithic scatters identified are located in the subalpine above 1,000 masl. Ethnographically, camps like these were used during hunting excursions for marmot or mountain goat in the alpine (Albright 1984).

Several sites are positioned on small knolls and ridges above ponds and lakes and may have served as hunting lookouts. Based on the limited archaeological materials found at most of these sites, many were likely the result of single use events. However, in terms of the density and variety of artifacts recovered, the assemblages from sites HdTm-6 and HdTo-1 are distinct and may have been repeated use sites.

No projectile points and no radiocarbon samples were recovered at any of the sites. However, the archaeological assessment conducted for the Eskay Mine in 1990 recorded an isolated chert biface, which was found at nearby Tom Mackay Lake (Rousseau 1990). The lanceolate biface is similar to bifaces dating to 7,000 to 9,000 BP in other parts of British Columbia and could indicate that people were using the region during the early Holocene. The only temporally diagnostic tools recovered during the AIA were microblades from sites HdTm-3, HdTm-6, HdTm-7, and HdTo-1. The presence of microblade technology on the northwest coast is documented as early as 10,000 years BP in southeast Alaska (Davis 1989; Ackerman 1992; Okada et al. 1992; Dixon 2008) and northern British Columbia (Carlson 1990; Matson and Coupland 1995; Carlson and Dalla Bona 1996). At Mount Edziza, a microblade industry was flourishing by at least 4,900 BP, but ceased to play an important role in toolkits by about 3,000 to 4,000 BP (Fladmark 1985). Based on the presence of microblades and the less hospitable climatic conditions during the Neoglacial period, some of the sites recorded during this AIA could date between 3,000 to 10,000 BP; however, microblade technology may persist much later in some regions of British Columbia.

Eleven obsidian artifacts were sourced to Mount Edziza flows nos. 2 (n = 2) and 3 (n = 9), located 100 to 110 km north of the sites (see Appendix F; Figure 8-1). Of the 10 identified sources of obsidian at the Mount Edziza Volcanic Complex, flow no. 2 is less commonly found in archaeological sites, while flow no. 3 is most commonly found. Although flows nos. 2 and 3 are chemically distinct, they are located in close proximity to each other near Goat Mountain (Godfrey-Smith 1986). By 9,500 to 9,000 BP, obsidian from Mount Edziza was already being traded over long distances on the north-northwest coast (Ackerman 1996), and Mount Edziza obsidian continued to be widely distributed into the protohistoric period. The routes of several ethnographically documented trails that ran through the Project area were discussed in Section 2.10; however, no evidence of prehistoric trails was identified during the AIA. The absence of evidence of prehistoric trails, such as furrows, is not surprising given that trails can quickly become overgrown with disuse, and the terrain along valley bottoms in the Project area is generally covered with dense vegetation and is subject to avalanches and flooding during spring freshet. In many cases, upland, subalpine areas may have been easier for travel, and travel may have been done during the winter months using snowshoes or following frozen streams, which would leave little trace archaeologically.

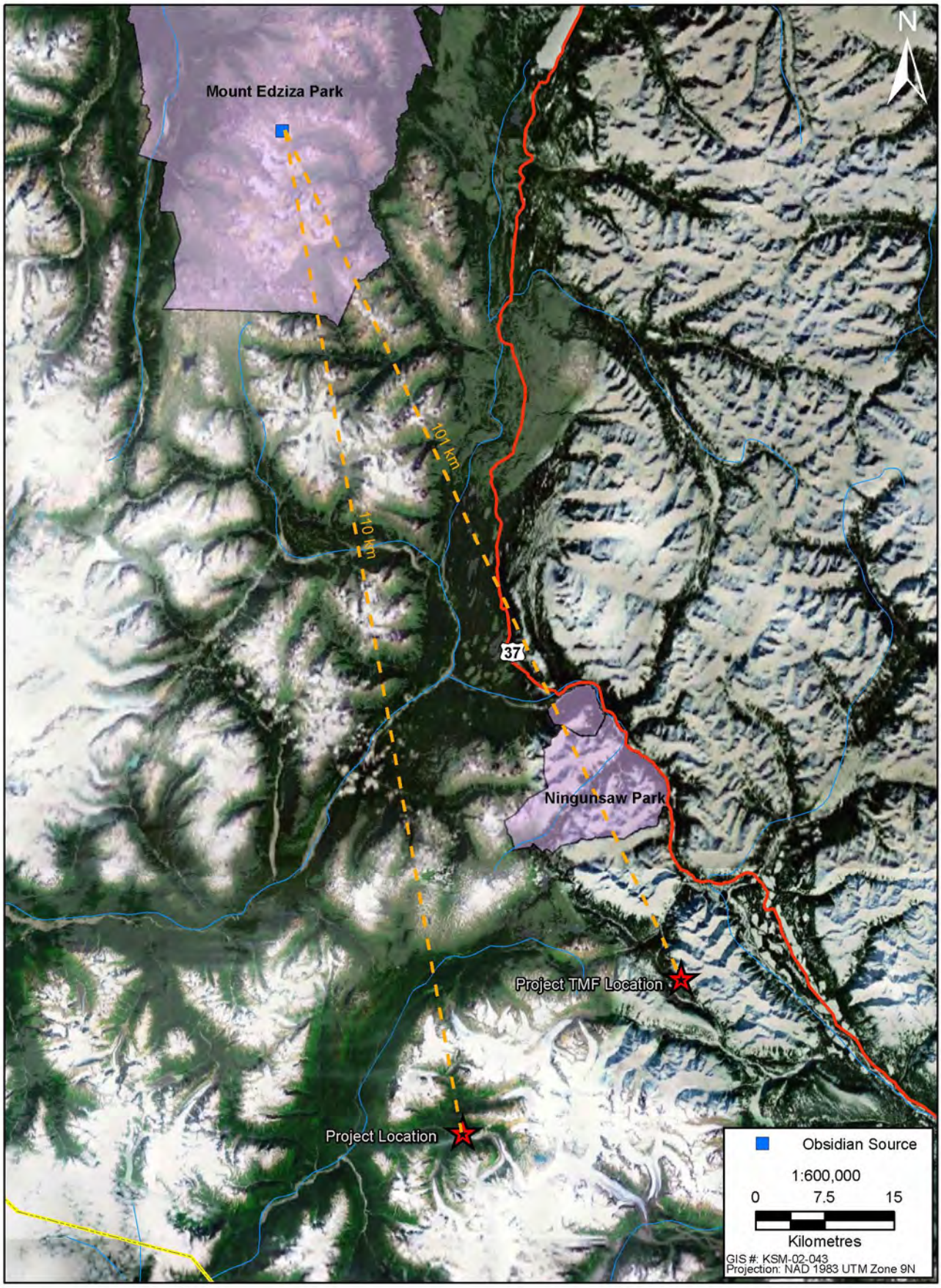

Figure 8-1

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Location of Mount Edziza and the Project

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9. Evaluation of Research

The field methods employed during the AIA of the Project are described in Section 3. These methods included extensive pedestrian survey, shovel testing, and visual inspection of tree throws and ground surface exposures in areas assessed to have archaeological potential.

The survey and shovel testing program employed during the AIA is described in permit 2008-0128. Shovel testing was implemented as a site discovery technique in areas assessed to have potential for buried deposits. In addition, a sample of low archaeological potential areas was shovel tested to confirm the assessments that were made. During the AIA, 5,931 shovel tests were conducted at 348 locations. When present, surface exposures and tree throws were also examined. Using these methods, 20 new prehistoric archaeological sites were discovered.

The methodology employed at the shovel test locations was evaluated the Archaeology Branch's Site ID Probability Calculator (Archaeology Branch, pers. comm.), and the mean confidence over all shovel test locations was calculated. For the 348 shovel test locations conducted on the project, 100 m^2 sites with at least four artifacts per square metre would have been identified at mean confidence of over 90%.

Based on the survey and shovel testing methodology employed and the success of the AIA at identifying small and sparse sites, the field methodology is assessed as having been suitable for achieving the objectives of the AIA for the Project. Collectively considered, the AIA results are commensurate with what is considered typical and expected given the study area's location and environment.

10. Closing

This report was prepared by Rescan Environmental Services Ltd. on behalf of Seabridge Gold Inc. and for the use of the Archaeology Branch of the Province of British Columbia. Any use, reliance, or decisions made by third parties based on this report are the sole responsibility of such third parties.

This study was not designed to address issues of traditional Aboriginal use and does not constitute a traditional use study. This report was written without prejudice to issues of Aboriginal rights and/or title.

We trust that the information contained in this report is sufficient for your present needs.

Sincerely,

Rescan Environmental Services Ltd.

Lisa Seip, M.A., RPCA
Senior Archaeologist

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Definitions of the acronyms and abbreviations used in this reference list can be found in the Glossary and Abbreviations section.

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Appendix A

Assessment Area Photos

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Appendix A. Assessment Area Photos

Plate A-1. Steep and variable terrain along the north side of Treaty Creek, looking west.

Plate A-2. Rock outcrops at the western end of the Treaty Creek valley, looking southeast.

Plate A-3. Steep slopes and dense vegetation along Teigen Creek.

Plate A-4. View of terrain along the proposed Transmission Line Alignment near the Switching Station, looking south.

Plate A-5. View of West Teigen Lake along the potential Tunnel Divide Portals Spur Road, looking southwest.

Plate A-6. View of terrain along the Tunnel Divide Portals Spur Road, looking north.

Plate A-7. View of terrain around Tom Mackay Lake along the proposed Coulter Creek Access Road, looking southwest.

Plate A-8. The terrain along the proposed Coulter Creek Access Road northwest of the Coulter Creek drainage.

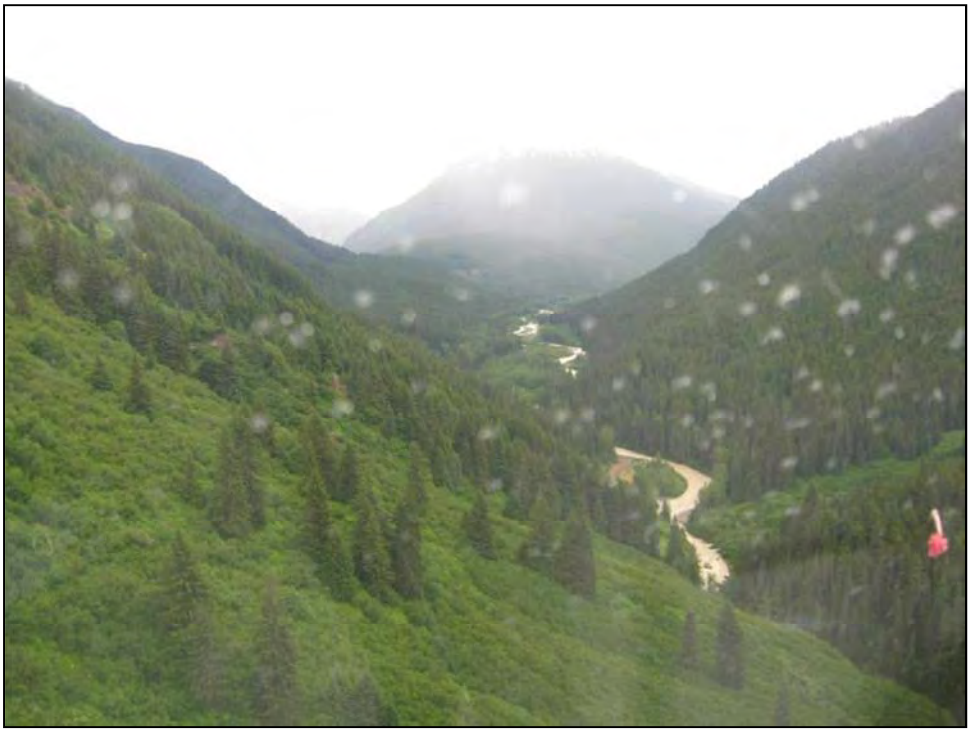

Plate A-9. Steeply sloped and rolling hills along Sulphurets Creek, looking east towards its confluence with Mitchell Creek on the Coulter Creek Access Road alignment.

Plate A-10. Hill overlooking Hodkin Lake to the southwest along the Teigen Canyon Bypass Road Alignment (no longer under consideration).

Plate A-11. Subalpine terrain along the Storie Creek Road alignment (no longer under consideration) east of Storie Creek, looking northeast.

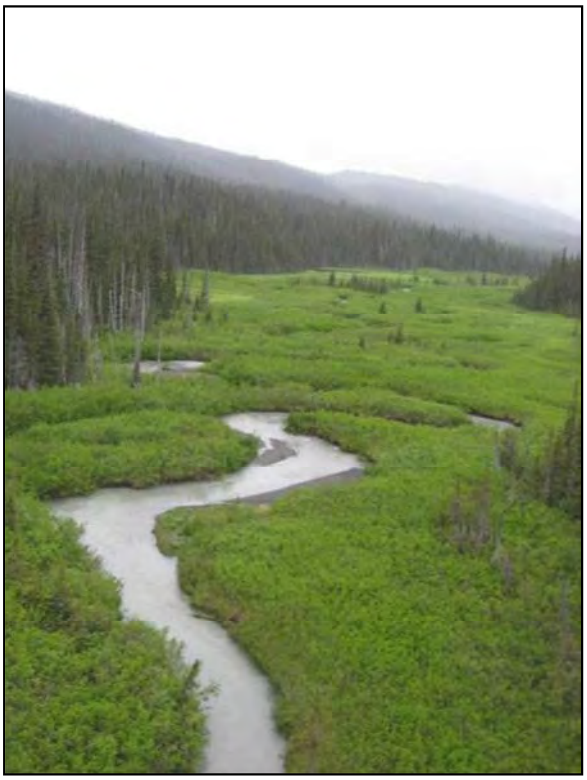

Plate A-12. Looking southeast over the Teigen South Tributary in the TMF.

Plate A-13. View of terrain along the south slope of the TMF valley, looking northwest.

Plate A-14. Marshy terrain within the Process Plant Site, looking southeast.

Plate A-15. Process Plant Site 3 (no longer under consideration), looking east.

Plate A-16. Shovel testing in the proposed Mitchell Pit, looking west.

Plate A-17. Pedestrian survey in the Sulphurets Pit area.

Plate A-18. Shovel testing in the proposed Kerr Pit.

Plate A-19. Shovel testing along the ridge to the southwest of Gingras Creek.

Plate A-20. View of the proposed Explosives Magazine area, looking east.

Plate A-21. View of the proposed Truck Shop area, looking north.

Plate A-22. Near the receding glacier at the head of Tim Williams Creek, a tributary of Treaty Creek.

Plate A-23. Examining an ice patch in the alpine near the proposed Iron Cap Expansion.

Plate A-24. Terrain and vegetation at Seabee Exploration Camp.

Plate A-25. Looking south across the proposed Construction Camp 1 area.

Plate A-26. View of the terrain of Construction Camp 2, looking northeast.

Plate A-27. View of Construction Camp 3 area, looking north over a marsh and Tom Mackay Creek.

Plate A-28. View of Construction Camp 4 terrain, looking northeast.

Plate A-29. View north from the top of a ridge in Construction Camp 6.

Plate A-30. View of Construction Camp 7 terrain, looking southeast.

Plate A-31. View west, of the southwestern half of Construction Camp 8.

Plate A-32. View of the terrain of Construction Camp 9, looking southeast.

Plate A-33. View of the terrain of Construction Camp 9, looking south across a shovel test location.

Plate A-34. View of the terrain of the proposed Construction Camp 11, looking north.

Plate A-35. View of the terrain in the proposed Switching Station, looking south.

Plate A-36. View north at the western end of the Taft Creek Fish Habitat Compensation area; Bell-Irving River photo left, Taft Creek outlet photo centre.

Plate A-37. View of the terrain in the Taft Creek Fish Habitat Compensation area.

Plate A-38. View of the terrain in the Glacier Creek Fish Habitat Compensation area, looking west.

Plate A-39. Aerial view of the Treaty Creek Fish Habitat Compensation area.

Plate A-40. View of the Treaty Creek Fish Habitat Compensation area, looking west.

Plate A-41. View of the Snowbank Creek Fish Habitat Compensation area.

Plate A-42. View of the Oweegee Creek Fish Habitat Compensation area.

Plate A-43. View of the Todedada Creek Fish Habitat Compensation area, looking northwest.

Appendix B

Shovel Test Locations Tables

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Appendix B. Shovel Test Locations Tables

Appendix B has been removed from the public version of this report to protect the locational information of archaeological sites outlined in the table. Additional information can be obtained from the complete version of this report, which is on file with the BC Archaeology Branch.

Appendix C

Shovel Test and Survey Maps

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Appendix C. Shovel Test and Survey Maps

Appendix C has been removed from the public version of this report to protect the locational information of archaeological sites illustrated on the figures. Additional information can be obtained from the complete version of this report, which is on file with the BC Archaeology Branch.

Appendix D
Archaeological Site Data

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Appendix D. Archaeological Site Data

Appendix D has been removed from the public version of this report to protect the archaeological site information outlined in this section. Additional information can be obtained from the complete version of this report, which is on file with the BC Archaeology Branch.

Appendix E

Memorandum: Glaciers and Archaeology,
Joseph M. Shea, Ph.D.

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MEMORANDUM	
Re:	Glaciers and Archaeology
Project:	KSM
Author:	Joseph M. Shea
Date:	20 December 2011
Attention:	Lisa Seip, Greg Norton

Statement of Qualifications:

I am currently a post-doctoral researcher at the University of British Columbia. My research focuses on glaciers in western North America, and in particular the relation between glaciers, climate, and hydrology. I received my PhD in 2010 from the University of British Columbia, and my M.Sc. (Geography) from the University of Calgary in 2004. My undergraduate degree was completed at McMaster University (Honours B.Sc. Geography, Minor in Geology) in 2001. I have worked as a glacier consultant with Rescan Environmental Ltd. since 2008.

1 Introduction

The Kerr-Stewart-Mitchell study area is a heavily glaciated region that contains numerous alpine glaciers and evidence for human activities (personal communication, L. Seip). Proposed ice roads or other glacier-based activities within the study area raise the possibility that archaeological materials may be found on or in close proximity to glaciated or recently deglaciated terrain. This memorandum examines (1) the differences between "ice patches" and "glaciers", (2) the potential for finding archaeological materials during glacier road construction, (3) an assessment of the travel risks associated with searching for archaeological remains on glaciers within the project area, and (4) the glacial history of the project area for the past 15000 years.

2 "Ice Patch" versus Glacier

Recent archaeological finds on and around ice patches in Tatsenshini-Alsek Park in northwest British Columbia (Beattie et al., 2000), the Mackenzie Mountains of the southern Yukon (e.g. Farnell et al., 2004; Hare et al., 2004; Dove et al., 2005) and southern Norway (Nesje et al., 2011) have demonstrated the possibility of recovering archaeological artifacts from retreating ice bodies. It is important to recognize that there are significant differences between "ice patches" and "glaciers", though both are part of the continuum of semi-permanent ice features in high alpine or high latitude environments.

2.1 Ice patches

Ice patches are perennial snow features that persist for greater than two consecutive years, and they consist of snow and firn (multi-year snow) in their upper layers, and ice in their deeper layers. The ice layers are formed by the compaction of snow from subsequent accumulations, which generate overburden pressures. Ice patches are generally found in sheltered high-latitude or high-altitude environments where summer melt conditions are frequently insufficient for melting the previous winters snow accumulation, and they may range in length from 100 to 1000 m, and in depth from 10 to 80 m (Meulendyk, 2010). They typically form on north or east-facing leeward slopes, or in small gullies or depressions, which receive both greater snow accumulations and lower amounts of solar radiation than the surrounding terrain. Ice patches are not sufficiently large enough (or on steep enough slopes) to generate internal flow dynamics. Ice patches are often described as glaciers in the literature, which adds some small measure of confusion to this issue.

2.2 Glaciers

In contrast, glaciers are perennial snow and ice features that persist for greater than two years, and where mass is transferred between accumulation areas and ablation (melt) areas through sliding, ice deformation, or bed deformation. Glacier ice is formed in the same way as ice patches, and each layer of ice represents an annual layer of snow that has been compressed into ice by subsequent accumulations. Glacier velocities are typically greatest at the surface and in the interior regions of a glacier. At the base of the glacier and along the edges, frictional forces between the sliding/deforming ice mass are greater, and thus flow velocities are reduced. On larger glaciers (greater than 1 km^2), these processes are highly erosive and destructive, as evidenced by the scoured bedrock surfaces typically found in the forefield of retreating glaciers, the massive morainal deposits, and large glacial erratic boulders that can be transported significant distances from their origin by glacier ice.

2.3 Archaeological recovery from glaciers and ice patches

It is my opinion that the potential for recovering archaeological artifacts or human remains is greater for ice patches than it is for glaciers, primarily due to the lack of internal deformation or sliding on ice patches, and for the greater likelihood of human activities (e.g. hunting, travel) on or near ice patches. In the southwest Yukon, for example, ice patches are thought to provide cariboo a source of freshwater and respite from insects, indicating that they would have been good hunting grounds. Organic matter deposited on the surface of ice patches, provided it is buried rapidly and protected from the elements, can be preserved for over 8000 years (Farnell et al., 2004).

However, it is recognized that human remains and archaeological artifacts may also be recovered from glaciers. The famous iceman “Otzi” was recovered from a glacier in the Tyrolean Alps, but preservation of the body for 5200 years and subsequent discovery was only made possible by a remarkable series of coincidences. First, the Iceman is believed to have died on bare permafrost ground at 3200 m, during a relatively warm period. Subsequent burial by winter snows only reached a maximum thickness of between 5 and 25 m. Due to his location on a thinly glaciated saddle, the body was protected from glacier flow by two rock ridges (Sjøvold, 1996), though the body was compressed significantly by the overburden pressure of the glacier.

Human remains (named Kwädąy Dän Ts'ìnchį, or “long ago person found”), were recovered from the edge of a small glacier in Tatshenshini-Alsek Park, in northwest British Columbia. Initial reports suggested that the individual was preserved after falling into a crevasse (Science, 1999), but it was later established that he likely died on the surface and was subsequently buried by snow and incorporated into the glacier ice (Beattie, 2000). Again, this individual was preserved primarily due to the remarkable coincidence of weather conditions at and immediately after the time of deposition, and his location near the edge of the glacier where ice flow and deformation was minimal.

3 Archaeological potential of project area glacier roads

The Kerr-Stewart-Mitchell study area is heavily glacierized, with large glaciers and icefields extending from mountain top elevations to nearly 900 m above sea level (asl). The Mackie Glacier, site of a proposed ice road, is nearly 2 km across at its terminus, and is fed by multiple high-elevation accumulation basins.

To assess the potential for finding archaeological artifacts or human remains on or near glaciers, several factors should be considered (e.g. Dixon et al., 2005) :

1. The potential for human activity. Evidence of human activity, animal occurrences or trails near the proposed mine developments should indicate that the area is more likely

to contain archaeological artifacts

2. The preservation environment. The margins of glaciers will be the most likely place to find artifacts, and in particular near or above the elevation of the end-of-summer snowline. At low elevations, winter snowfalls will not be sufficient to preserve organic matter through the summer. Conversely, winter snowfall accumulations at high elevations can be greater than 6 m (Rescan, 2010) and the overburden pressure will likely destroy soft organic matter. Areas exposed to meltwater percolation or surface streams will also not be good candidates for preservation.
3. The possible travel environment. Materials deposited on the glacier surface will travel down-glacier, but as this will bring them from zones of preservation to zones of degradation. Scavengers in the environment may also remove many traces of human remains on the surface of the glacier, through stone or bone artifacts may still be preserved. Any victim falling into a crevasse on an active glacier would likely be very poorly preserved, due to the internal deformation of ice and the grinding action of the glacier over the bedrock.

It is my opinion that the probability of finding archaeological materials or human remains on the surface of the active glacier or in the immediate forefield of the glacier are very low. It is more likely that artifacts or remains might be recovered on or near stagnant ice bodies (remnant glaciers, small ice patches, or stagnant ice-cored lateral moraines) at elevations that are near or above the current end-of-summer snowline elevation.

4 Glacier travel risks

Glacier travel contains many risks that inexperienced or ill-prepared travellers may not be able to mitigate, and these risks vary with the season of travel, location on the glacier, and weather conditions.

Glacier travel hazards include:

- crevasses (may be visible, or hidden by snow)
- unstable snow bridges spanning crevasses
- seracs and icefalls (falling ice blocks)
- slips and falls (and self-inflicted injuries from crampons and ice axes)
- hypothermia and frostbite (year-round)
- snow and/or ice avalanches
- glacial moraines (steep and unstable rocky debris)
- whiteouts (navigation)
- rockfalls (from melting debris)

Travelling in glacier terrain requires a well-prepared and well-trained rope team, route-finding experience, and a thorough knowledge of crevasse rescue techniques. Rapidly changing weather conditions and frequent whiteouts or poor visibility on glaciers require that all team members be comfortable with unplanned overnight stays.

5 Regional glacier change history

There appears to be little direct research related to the glacial history of the project area. This section broadly describes glacier activity in western North America over the past 25,000 years, which can be grouped into four periods: the Last Glacial Maximum, the Hypsithermal, Neoglaciation, and the present. Where relevant, inferences to regional conditions have been made. A timeline summarizing the main points in this section is given in Figure 1.

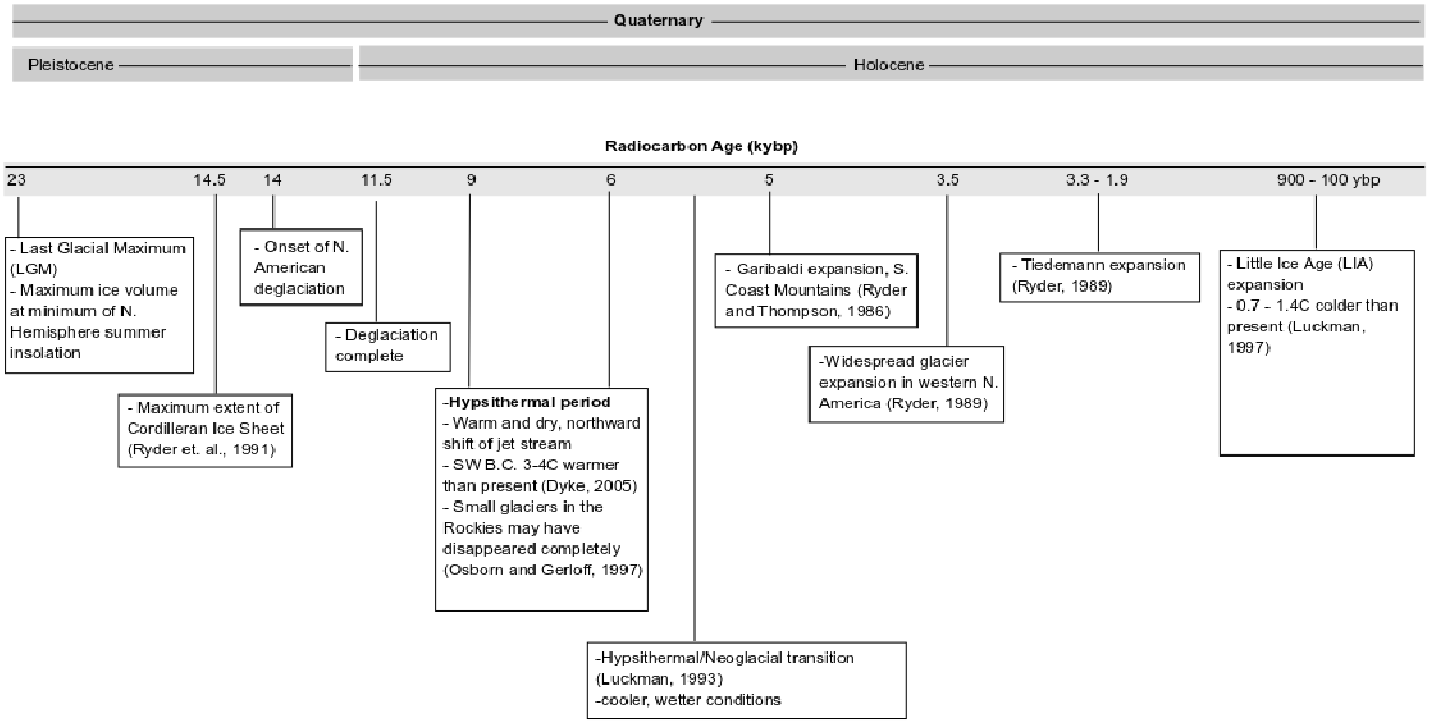


Figure 1: Summary timeline of glacial history for western Cordillera.

5.1 The Last Glacial Maximum (25 kyr – 14 kyr BP)

During the Last Glacial Maximum (LGM) period, or the last great glaciation of the Pleistocene period approximately 25 000 years before present (yr BP), large ice sheets covered much of the northern Hemisphere. Growth and decay of ice sheets through the Quaternary period were driven primarily through orbital changes, which affect the amount of incoming solar radiation (insolation) received during the summer melt season. Maximum ice volumes during the LGM occurred at the trough of summer insolation in the northern hemisphere (Clark et al., 2009).

At the height of the LGM, much of Canada was covered by the Laurentide Ice Sheet, which originated in northeast Canada. The Cordilleran Ice Sheet, which coalesced from mountain glaciers in the Coast Mountains and the Rockies, covered most of British Columbia, and extended out over Vancouver Island and Haida Gwaii (Figure 1; Clague and James, 2002). Available evidence suggests that the Cordilleran Ice Sheet reached its maximum extent around 14.5 kyr BP (Ryder et al., 1991).

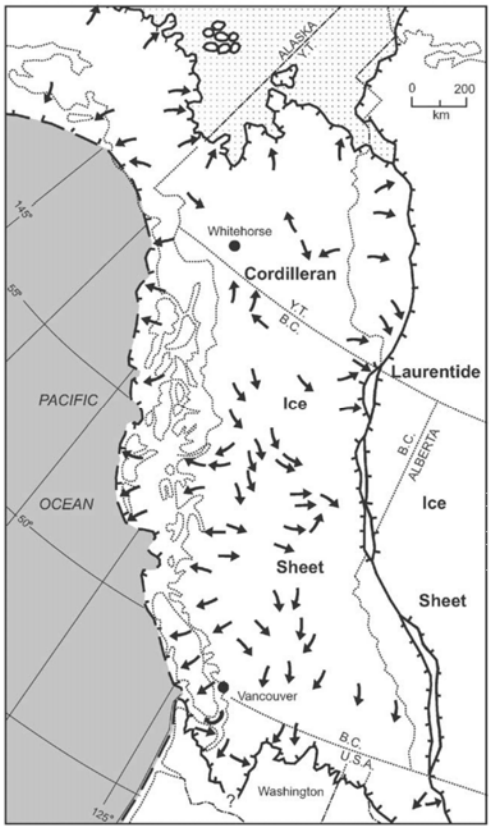


Figure 2: Maximum extent of the Cordilleran Ice Sheet during the Last Glacial Maximum, approximately 18 – 15 kyr BP (adapted from Clague and James, 2002)

5.2 Deglaciation (14 kyr – 10 kyr)

Cordilleran ice sheet decay began at approximately 14 kyr BP (Ryder et al., 1991), due in part to increases in summertime insolation (Clark et al., 2009). Ice sheet instabilities developed in response to increased sea levels, and marine-terminating glaciers along the west coast rapidly calved back to protected bays. By approximately 11.5 kyr BP, deglaciation was essentially complete (Ryder et al., 1991), and a rapid deglaciation is supported by observed rates of uplift in southwestern B.C. (Clague and James, 2002).

5.3 Hypsithermal (9 kyr – 6 kyr)

Following the deglaciation of the Cordilleran Ice Sheet, evidence exists for active alpine glaciation and stagnant glacier tongues in in interior valleys (Clague and James, 2002). The transition to a warm and dry period known as the Hypsithermal occurred by ca. 9 kyr BP. A northward shift of the jet stream resulted in warmer temperatures across much of British Columbia and the Yukon. Temperatures in southwestern British Columbia, for example, were approximately 3-4C warmer than present during the Hypsithermal (Dyke, 2005). Warm temperatures likely resulted in the significant retreat of alpine ice masses in northwestern British Columbia during this period, which may be relevant for archaeological studies. Small glaciers in the Canadian Rockies, for example, may have disappeared completely (Osborn and Gerloff, 1997).

5.4 Neoglaciation (6 kyr – 0.1 kyr BP)

The period subsequent to the Hypsithermal, known as the Neoglacial, was characterized by cooler and wetter conditions (Luckman, 1993, Mann and Hamilton, 1995) and glacier expansions throughout the western Cordillera. Several phases of glacier expansion in this period have been

identified:

- The “Garibaldi” expansion occurred between 6 kyr and 5 kyr BP (Ryder and Thompson, 1986)
- The “Tiedemann” advance occurred between 3.3 and 1.9 kyr BP (Ryder and Thompson, 1986)
- The “Little Ice Age” advance, which was initiated prior to approximately 750 years BP (Jackson et al., 2008). Greatest glacier extents during the Holocene occurred during the Little Ice Age between 240 and 100 years BP.
- Temperatures reconstructed from tree ring data at the Columbia Icefield suggest that average temperatures during the Little Ice Age were 0.7 – 1.4 C cooler than the 1961-1990 mean.
- At the project site, evidence for relatively recent Little Ice Age glacier extents are highly visible: polished bedrock in the glacier forefield; large, fresh lateral and terminal moraines; vegetation trimlines.

5.5 Little Ice Age – Present

Since end of the Little Ice Age, rapid increases in temperature have resulted in dramatic reductions in mountain glacier volumes worldwide. The greatest changes, however, have occurred at lower elevations, with significant downwasting (lowering of the glacier surface elevation due to melt) and simultaneous glacier retreat. At long-term glacier mass balance sites, slight thickening or little to no change has been observed at the highest elevations (Dyurgerov and Meier, 2000) despite the mean temperature increases, which suggests that current glacier conditions at these elevations might not be much different from those observed during the past 1000 years. This point may have direct relevance on the likelihood of finding archaeological materials at high elevations.

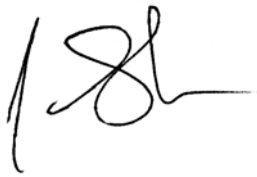
6 Summary

In heavily glaciated regions, the probability of finding human remains or archaeological materials on the surface of an actively moving alpine glacier is small. While warmer conditions and reduced glacier extents between 6000 and 9000 years BP may have allowed for greater human activity in the study area, subsequent glacier advancement during the late Holocene (3000 – 100 years BP) would likely remove any traces left in the current glacier forefields . If any evidence of human activity is to be found, it is my opinion that it will most likely be located on or adjacent to small or stagnant glaciers in the study area, at an elevation that permits preservation of organic materials, and in sheltered recesses or depressions.

7 Closure

This memorandum was prepared for Rescan Environmental Ltd. The materials within this document reflect my judgement and opinion in light of information available at the time of preparation. I accept no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this document.

Yours sincerely,



Joseph Shea, M.Sc., PhD

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Appendix F

Nisga'a Nation Boundaries and Asserted Boundaries of First Nations within the KSM Study Area

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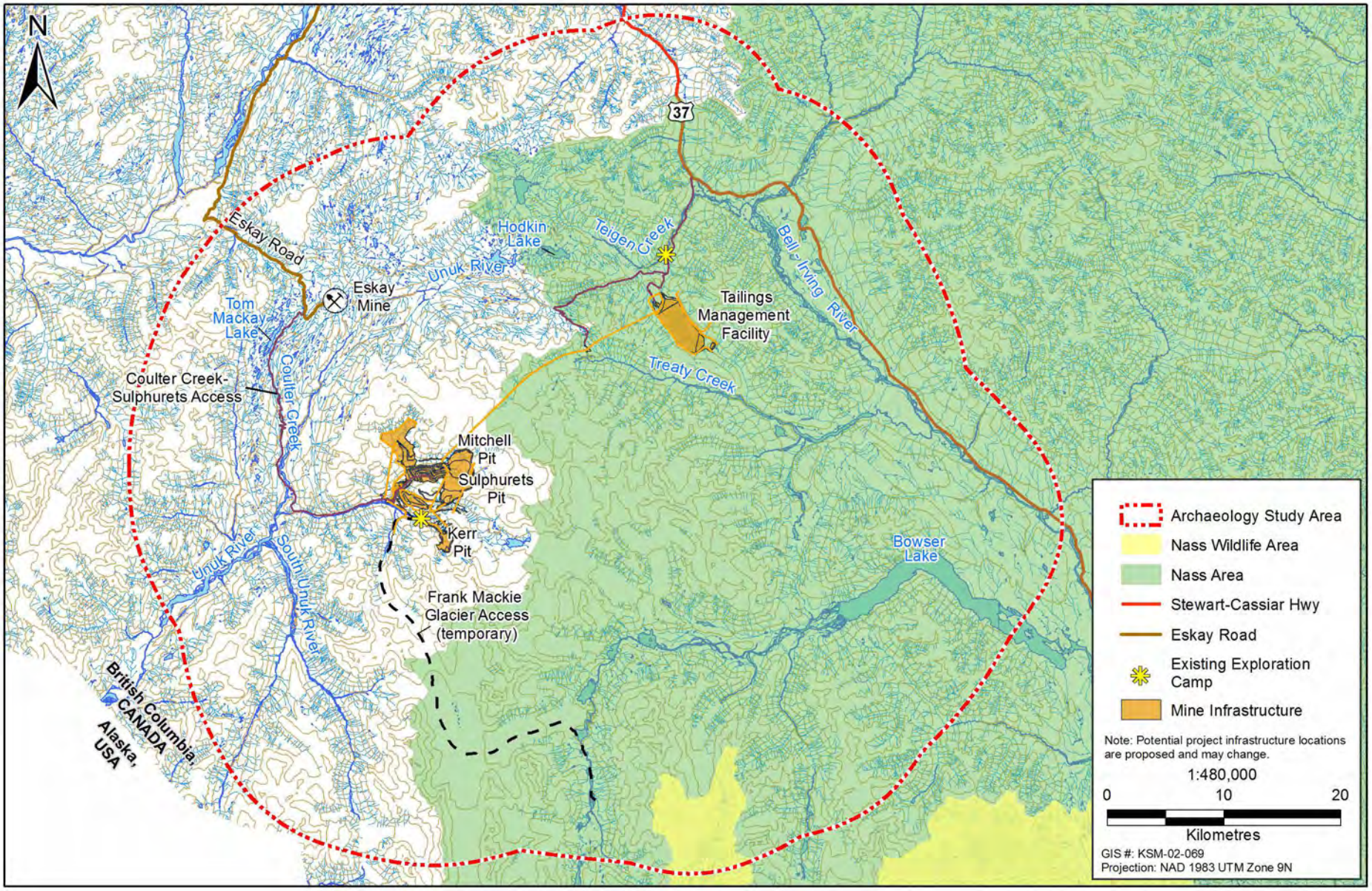

Figure F-1

SEABRIDGE GOLD
KSM PROJECT

Proposed KSM Project in Relation to Nass Area and Nass Wildlife Area

Figure F-1

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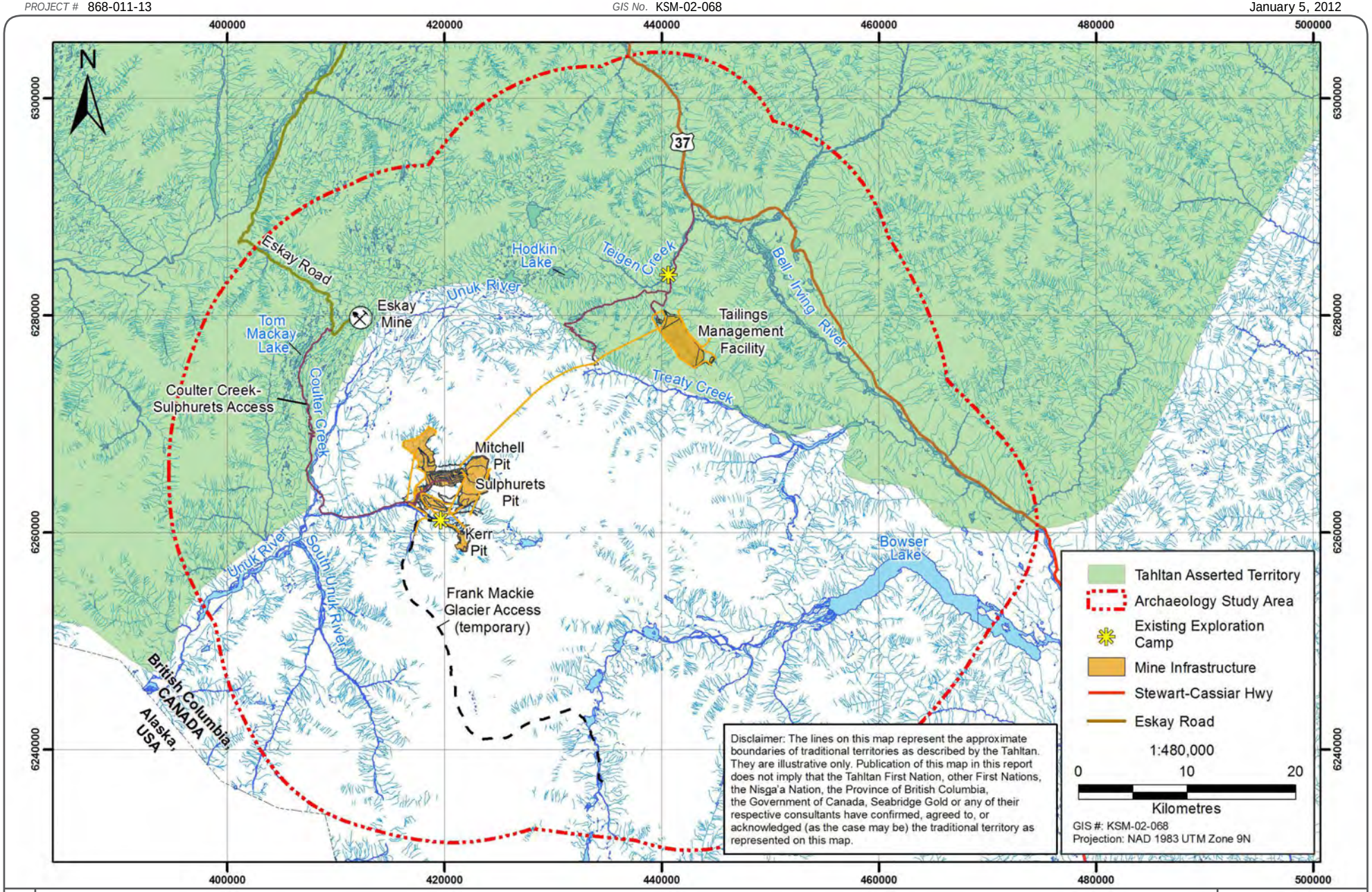

Figure F-2

Figure F-2

SEABRIDGE GOLD
KSM PROJECT

Proposed KSM Project and Tahltan Asserted Territory

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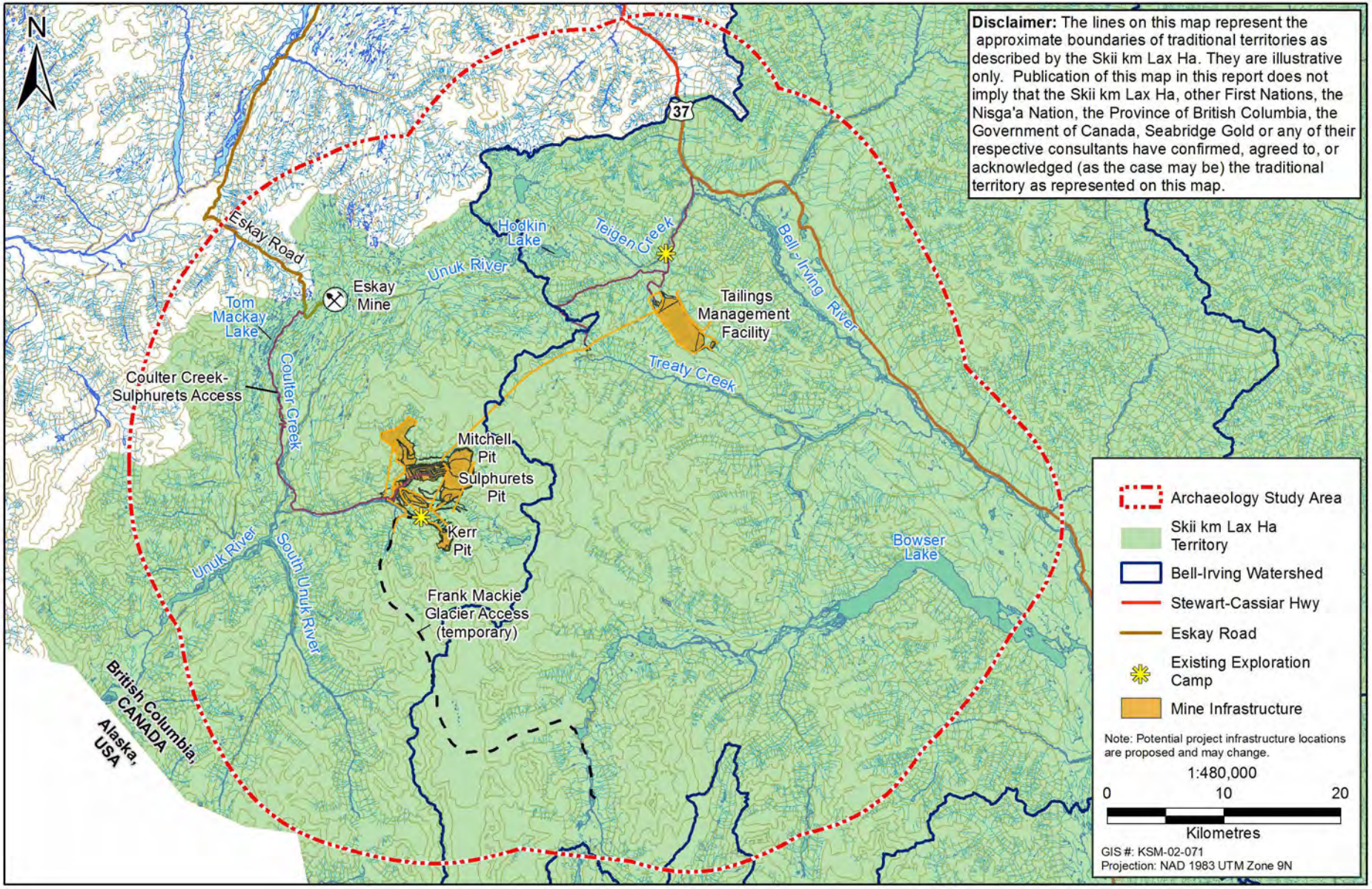

Figure F-3

SEABRIDGE GOLD
KSM PROJECT

Proposed KSM Project and Skii km Lax Ha Asserted Territory

Figure F-3

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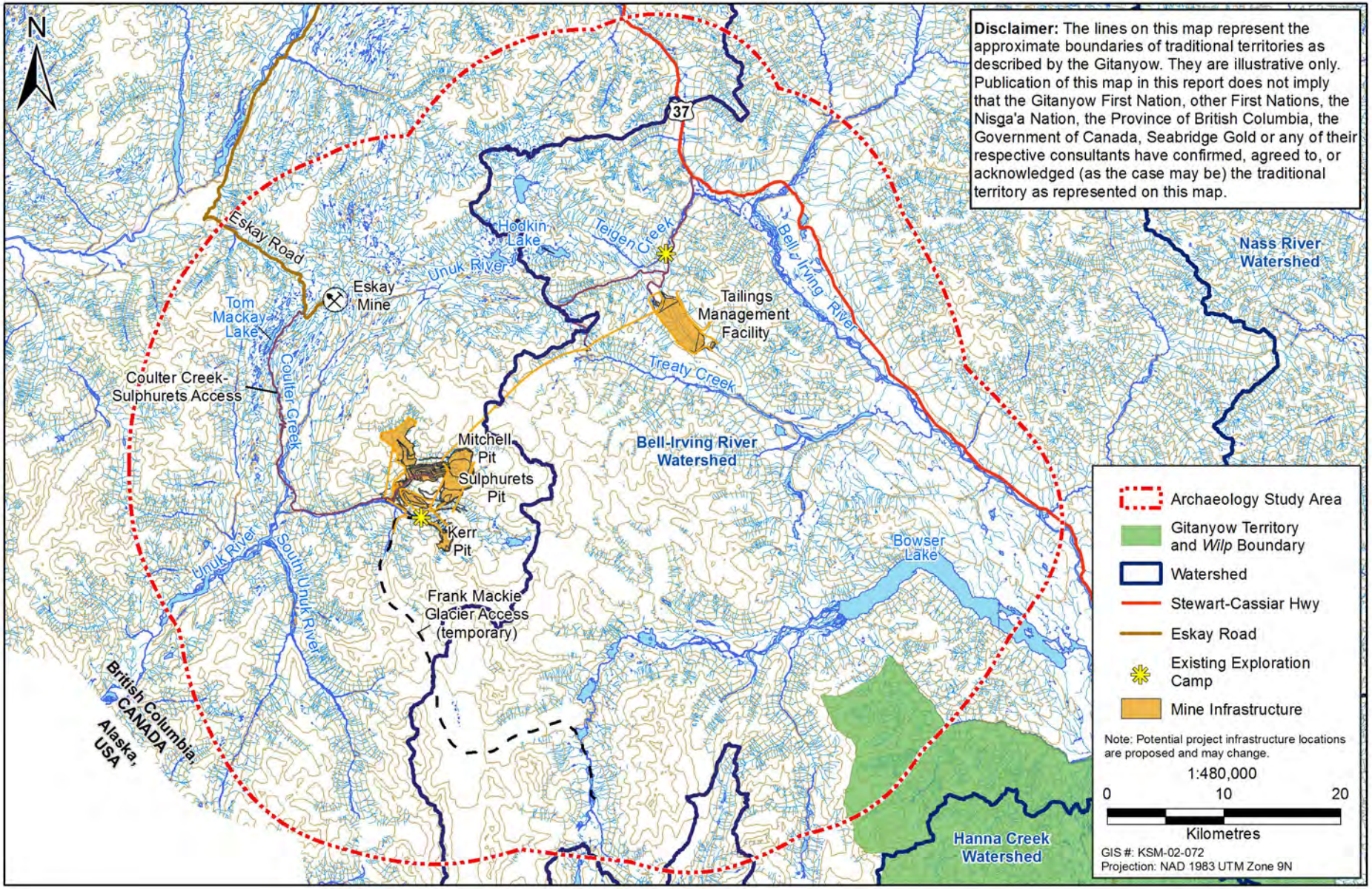

Figure F-4

SEABRIDGE GOLD
KSM PROJECT

Proposed KSM Project and Gitanyow Asserted Territory

Figure F-4

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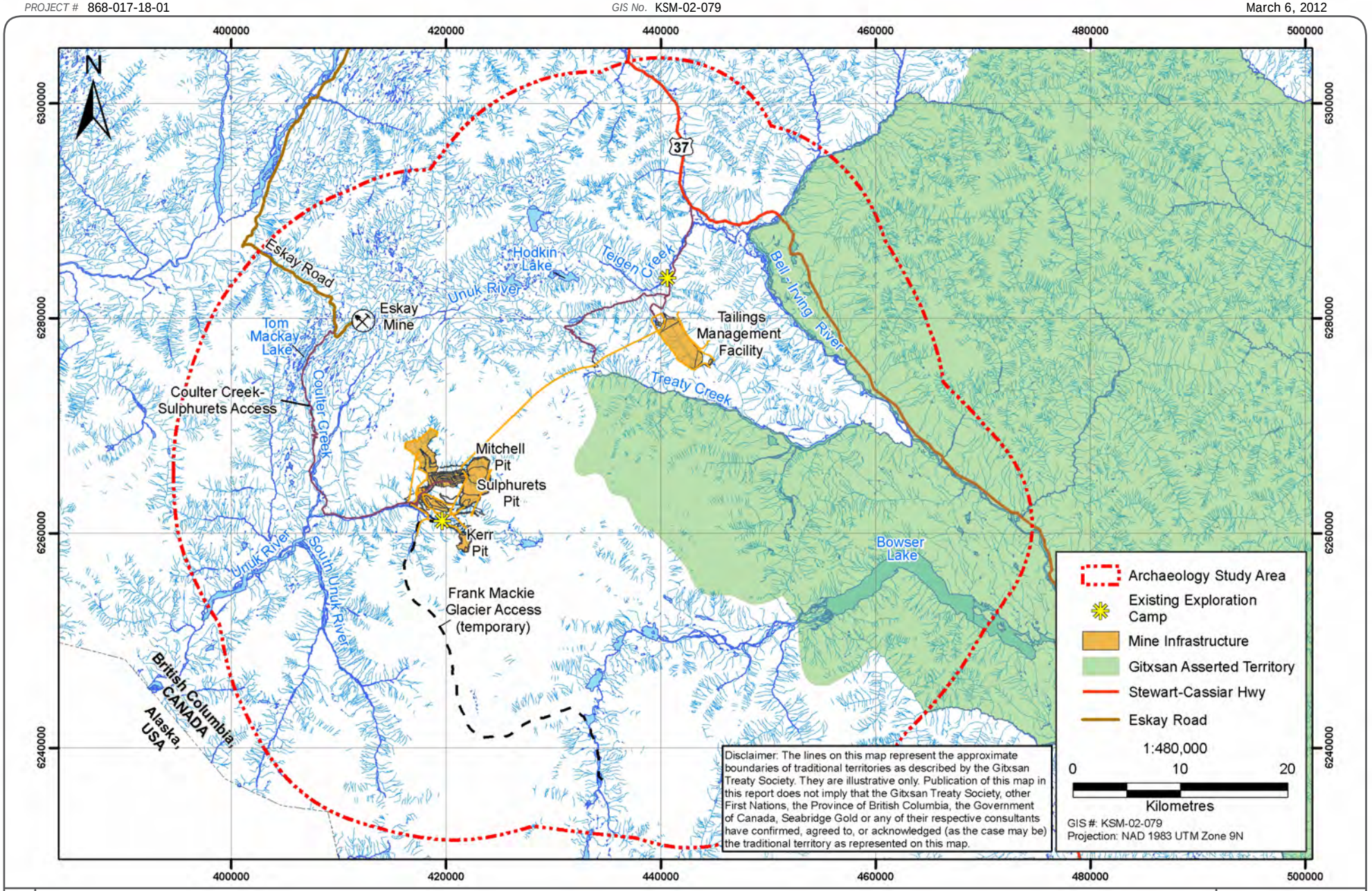

Figure F-5

Figure F-5

SEABRIDGE GOLD
KSM PROJECT

Proposed KSM Project and Gitxsan Asserted Territory

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Appendix G
Geographic Place Names

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Appendix G. Geographic Place Names

Place Name	Description	Source
Behm Canal	Shortly after Cpt. James Cook was killed in Hawaii in 1779, his ships arrived in Petropavlovsk, Kamchatka, with a young George Vancouver on the crew. Magnus von Behm was the governor of Kamchatka and spread the news of Cook's death to Europe. On voyage in 1793, Cpt George Vancouver named the canal after Behm.	USGS (2010)
Bell-Irving River	Named after Duncan Peter Bell-Irving, a surveyor from Vancouver who died in Belgium during World War I. Its Gitxsan name is *Sto'ot Tsitxemsem*, meaning "river beside the Nass River". Historically, the Bell-Irving River was often called the north or west fork Nass River.	Sterritt et al. (1998), BCGN (2010)
Bob Quinn Lake	Named after Robert Quinn, a lineman on the Dominion Yukon Telegraph Line who lived at nearby Echo Lake for many years.	Akrigg and Akrigg (1997)
Bowser Lake	Named after William J. Bowser, a former Premier of the British Columbia. In 1875, James Gardiner's Gitanyow guide called it "Tal Tan Lake." Its Tset'saut name was *Suutsii'ada* or *Thuutsii'ada*, meaning "murky water."	Sterritt et al. (1998), BCGN (2010)
Iskut River	Uncertain. Could be a Nisga'a word meaning "stinky." Pronunciation is likely closer to its former spelling, "Scoot."	Ball (1983), and Akrigg and Akrigg (1997)
Ningunsaw River	Tahltan word meaning "rock under ground."	Akrigg and Akrigg (1997)
Oweegee Lake	From *Awiijii*, a Tset'saut word meaning "wind whistling". From a Tset'saut legend, not described.	Sterritt et al. (1998)
Stikine River	"The River" or "Great River" in the Tlingit language. The Tahltan name for the Stikine River, *Tudessa,* has a similar meaning.	Albright (1984), Akrigg and Akrigg (1997), and BCGN (2010)
Teigen Creek	Named by land surveyor P. M. Monckton in 1929. Matthew Teigen was a trapper from Kispiox who worked in along this creek.	BCGN (2010)
Todedada Lake	Its Gitxsan name is *T'amlaaxw*, meaning "lake-trout."	Sterritt et al. (1998)
Treaty Creek	A Gitanyow elder reported that its Tset'saut name was *Kas X̲oo* or *X̲oo*, meaning "grizzly bear." Treaty Creek is the location of a treaty or treaties between the Talhtan and Nisga'a, and the Tahltan and Gitxsan.	Sterritt et al. (1998)
Unuk River	Unuk was recorded as the "Indian name" for the river as early as ca. 1880 to 1900 (USGS 2010), although in 1906 it was reported to be closer to *Junuk* or *Junock* (Goldschmidt et al. 1998). Dr. Fredrick Eugene Wright of the United States Geological Survey conducted early geological surveys in the area and reported that *Junuch* is Tlingit for "dream" (Wright 1907). In the 1940s, several Tlingit elders used the term *Joona x̲ Teikweidi* to describe members of the *Teikweidi* clan who traditionally used Burroughs Bay and the mouth of the Unuk River (Goldschmidt et al. 1998).	Wright (1907), Goldschmidt et al. (1998), and USGS (2010)